DECEMBER
1 9 5 8

# FOUNDRY

A PENTON PUBLICATION

## Casting 150-Ton Steel Housing

p. 73

Diecasting Aluminum V-4 Motor Blocks
p. 62

Feeding Systems for Permanent Molds
p. 70

Chemistry Affects Gray Iron Quality
p. 86

CONTENTS—page 3

Highest quality Wyoming Bentonite for superior casting finish, YELLOWSTONE has higher green strength and permeability than competitive clays, and its lower bulk density results in significant savings when sands are formulated by volume. Plant location assures supply summer and winter.

At last, a consistent southern bentonite from a primary producer with assured supply! SOUTHERN STAR offers all of the important properties of a good southern bentonite, such as low dry strength, high green strength and excellent shake-out, plus it is compatible with western bentonite.

N

W

E

S

YELLOWSTONE · SOUTHERN STAR · AUTO-BOND · SERVICE

**Magcobar**
AGRICULTURAL AND INDUSTRIAL PRODUCTS

ONE OF THE DRESSER INDUSTRIES

Extremely low-viscosity bentonite, AUTO BOND is pumpable with 25% greater additions, making it ideal for use in slurry systems in which mulling cycles are short. AUTO BOND eliminates the combining of western and southern bentonites and is perfect for iron and non-ferrous foundries.

## ONLY MAGCOBAR HAS ALL 4!

Whatever the direction of your bentonite needs, you can rely on Magcobar for superior products and service in virtually unlimited supply. For molding or core sands; for ferrous or non-ferrous metals; for your methods of operation, there's a Magcobar bentonite for your specifications!

You can standardize with Magcobar bentonites, too, because Magcobar has the world's largest reserves of high-quality, uniform raw materials. These proved reserves—plus Magcobar's rigid quality-control processing — are your assurance of consistent bonding agents, bag after bag, carload after carload.

For full technical information and prices, call, write or wire the man from Magcobar.

**MAGNET COVE BARIUM CORPORATION**
**Box 6504 • Houston, Texas**

**Checking Regulus I surface-to-surface missile** prior to launching from experimental cart. For the use of Ni-Cr-Mo steel castings in the launching cart, Chance Vought was judged a National Award Winner in the Third Product Development Contest conducted by the Steel Founders' Society of America.

# How castings of 4330 nickel-alloyed steel help boost a missile up, push assembly cost down

*20-Ni-Cr-Mo steel castings replace 73 detail parts, eliminate 300 hardware items in new launching cart*

Regulus I, made by Chance Vought, is normally boosted skyward from a rail launcher. The Navy, however, wanted a more economical launching technique that would utilize a carrier's powerful catapults . . . that would also simplify handling of the missile aboard ship.

*The answer was the expendable catapult cart you see above.*

The carts, also made by Chance Vought, are assembled with 20 cast 4330 steel cluster joints welded to tubing of the same material. These castings replaced 73 detail parts required in the plate-type fittings of the experimental units used to prove the idea. They also eliminated 300 hardware items, such as nuts and bolts. Assembly is easier, and far more economical.

Why Ni-Cr-Mo steel for the castings? The 4330 composition of 1.8% Ni .65% Cr. .25% Mo heat treated to 125,000 and 150,000 psi gives these castings the combination of high strength and great toughness needed to stand up to the tremendous shock of take off.

*What about your product?* Can it use the economy, high strength, and shock resistance offered by Ni-Cr-Mo steel castings? You can get complete information by writing:

**THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street New York 5, N. Y.

# INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

# Fast Table Service

## Easy loading and unloading of Wheelabrator® Swing Table speeds work handling

The unequalled versatility of a Wheelabrator Swing Table is the key to important savings for scores of foundries. Many castings that are impractical to clean by any tumbling process can be cleaned on a Swing Table with remarkable ease and economy. In many cases, the costly air-blast room can be eliminated.

Designed to handle a wide range of work, the Swing Table cleans mixed sizes in a single load with equal efficiency. At Alloy Steel Castings Co., Southampton, Pa., for example, castings from ½" square to 48" in diameter are cleaned in mixed loads, with no waiting to accumulate work of any given size.

The unrestricted area above the work table when the door is open permits use of mechanical loading devices for most efficient handling of any type of work. One Swing Table unit can be served by several auxiliary work tables, further reducing down-time for loading. Double-door units having a table on each door offer still greater production capacity.

*For more information, write today for Bulletin 119-D suggesting money-saving applications of Swing Table equipment.*

**WHEELABRATOR**
**CORPORATION**

50 YEARS OF PROGRESS
WHERE PIONEERING LEADERSHIP INSURES PERFORMANCE

**505 South Byrkit Street Mishawaka, Indiana**

Canadian Offices: Scarborough (Toronto) — Montreal

*World's largest manufacturer of airless blast cleaning equipment and abrasives*



Circle 554 on Page 51

# FOUNDRY

A PENTON PUBLICATION

December 1958

Volume 86 — Number 12



**EDITORIAL STAFF**

FRANK G. STEINEBACH
*Editor*

WILLIAM G. GUDE
*Managing Editor*

EDWIN BREMER
*Metallurgical Editor*

ROBERT H. HERRMANN
*Associate Editor*

JACK C. MISKE
*Associate Editor*

VIRGINIA C. TAYLOR
*Assistant Editor*

VIRGINIA B. HARMS
*Assistant Editor*

DON S. CADOT
*Art Editor*



**MAIN OFFICE**

Penton Building
Cleveland 13, Ohio
Main 1-8260

Branch Offices: New York, Detroit, Chicago, Pittsburgh, Washington, and London

(For addresses of branch offices, see Page 211)



**SPECIAL ARTICLES**

**Editorial** ..... 61

**V-4 Motor Block Is Diecast in Aluminum** ..... 62

Diecast V-4 blocks for outboard motors are made at Johnson Motors Div., Outboard Marine Corp. Maximum production is 30 per hour—By JACK C. MISKE

**New Laboratory Links Research and Production** ..... 66

General Electric Co. laboratory does research in materials and processes and applies developments to casting production—By ROBERT H. HERRMANN

**Feeding Systems for Permanent Mold Castings** ..... 70

The author discusses feeding problems encountered with permanent mold castings and suggests some solutions to those problems—By D. MILLER

**Casting 150-Ton Steel Mill Housing** ..... 73

Largest rolling mill housing ever cast at Wheeling, W. Va., works of Blaw-Knox Co. is 34 ft long and 17 ft wide.

**Quoting for Profit** ..... 76

Six participants in a panel discussion present information typical of that used as a basis for quotations on investment-cast parts

**Training Molders for the Navy's Floating Foundries** ..... 80

Navy molders trained at the U. S. Naval Molder School make castings that keep the Navy's fighting ships in action—By JAMES HURLBURT

**Use of Oxygen in the Coal-Fired Air Furnace** ..... 84

An analysis of the advantages of using oxygen to improve combustion of pulverized coal fuel in air furnaces—By J. B. LAPOTA

**Gray Iron Chemistry—How It Affects Casting Quality** ..... 86

An understanding of basic gray iron metallurgy is useful in diagnosing causes of many run-of-the-heat scrap castings—By FRANK L. ARNOLD

**OTHER FEATURES**

**International Foundry Congress** By M. M. HALLETT ..... 105
**Develops Automatic Molding System** By EDWIN BREMER ..... 118
**Michigan Regional Foundry Conference** By EDWIN BREMER ..... 128
**Man to Man** By RALPH L. LEE ..... 132
**Foundry Equipment Manufacturers Meet** By W. G. GUDE ..... 136
**Hot Blast System Cuts Coke Consumption** ..... 140
**New England Foundry Conference** By JACK C. MISKE ..... 145
**Magnesium Association Meets** By EDWIN BREMER ..... 168
**Canadian Foundry Conference** By ROBERT H. HERRMANN ..... 170
**Meditations of a Sandman** By HAROLD E. HENDERSON ..... 174
**Preventing Lighting-Off Explosions** By J. B. SMITH ..... 180
**Trouble Shooting** By C. W. AMMEN ..... 194

**REGULAR DEPARTMENTS**

**Foundry Equipment and Supplies Digest** ..... 151

**Men of Industry** ..... 94
**Obituary** ..... 185
**Questions and Answers** ..... 90
**Readers' Comment** ..... 57
**Statistics** ..... 191
**The Shakeout** ..... 198
**With the Editors** ..... 10
**Around the Country** ..... 186
**Calendar of Meetings** ..... 16
**Foundry Developments** ..... 126
**How To Do It** ..... 116
**Industry Briefs** ..... 114
**Late News** ..... 33
**Literature for Foundrymen** ..... 164

**Business Staff—page 235** **Classified Advertising—page 227** **Advertisers Index—page 235**



**FOUNDRY** is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions.

Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified for under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2. Published monthly and copyright 1958 by The Penton Publishing Co., Penton Building, Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

I keep an open mind... try new sand additives when they come along, especially when they promise better castings or lower cost. Any new material that sounds promising gets a fair shake in my foundry. What burns me is to get low quality material or an off-standard batch—means too much readjustment all down the line. There's too much off-standard lately, so—

# I QUIT!

**(Fooling Around)**

# make me up a MIXED TRUCKLOAD of old reliable: Green Bond BENTONITE, ADM-Federal SAND STABILIZER, and Crown Hill SEA COAL

When I use these dependable ADM-Federal products, I know from experience I have perfect sand control. Their absolute uniformity from shipment to shipment assures me of successful duplication of tested sand mixes.

GREEN BOND, for instance, the purest of the western bentonites, is unmatched for bonding power and helps me get the permeability I need. I can buy CROWN HILL Sea Coal in any grind, and I know it is lowest in ash and sulphur content, highest in volatile, combustible material. ADM-Federal Sand Stabilizer keeps me out of trouble—provides better flowability, eliminates expansion defects and improves shakeout.

They say you pay for quality—but I found a way to save money and still buy ADM-Federal quality. I tell my ADM Field Service Engineer to make me up a mixed carload or truckload... gives me the price benefit of lowest cost per bag and saves a lot of money on freight. I can have our lower volume requirements included, too, like ADM-Federal Facing Compounds, Washes, Plumbagos, and Core Binders.

**I quit fooling around**—from now on I'm buying ADM-Federal in quantity lots. It costs less, saves me trouble, and keeps the foundry running smooth!

Archer Daniels Midland company
FEDERAL FOUNDRY SUPPLY DIVISION
2191 West 110th Street · Cleveland 2, Ohio

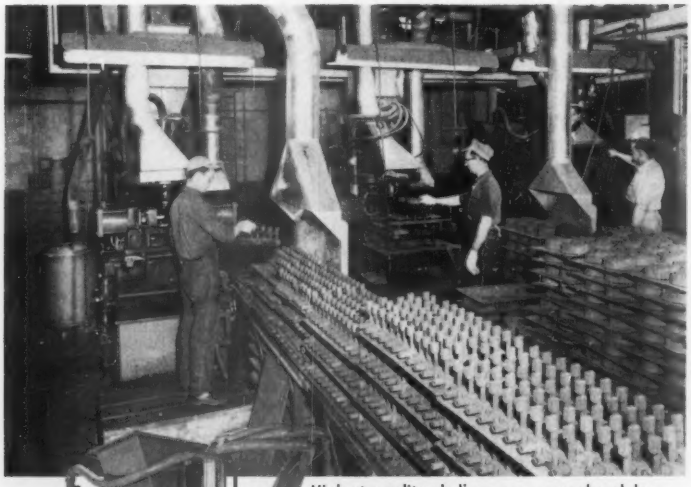



Circle 555 on Page 51

# from EATON Manufacturing Co.

"Our BLO-CORE machines have opened new fields of application for Permanent-Mold Gray Iron Castings and have made us more competitive due to net cost reductions . . ."

HOWARD U. McCLELLAND, Chief Engineer, Foundry Division



Highest quality shell cores are produced by "Blo-Core" machines to insure uniform castings for a host of industries served by Eaton Manufacturing Company's Foundry Division at Vassar, Michigan.

Millions of permanent-mold gray iron castings are produced annually by the Foundry Division of Eaton Manufacturing Company. These castings come in intricately-cored designs and shapes weighing from a few ounces up to twenty-five pounds. Great uniformity is an absolute necessity.

To meet the challenge of maintaining high quality while keeping costs as low as possible, Eaton turned to the C & S "Blo-Core" automatic shell machine. How well the "Blo-Core" performed this vital assignment can best be summed up in the above quotation of the division's chief engineer, who added: "To date we have made several hundred thousand shell cores on these machines and are very pleased with the results."

Perhaps your operation can profit from the many advantages offered by the fully automatic "Blo-Core." Our experienced engineers will be pleased to help you solve your foundry problems. Write for Bulletin CS-57.

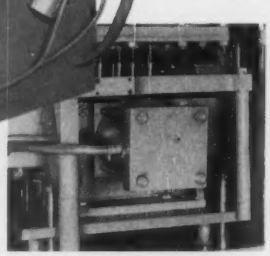
Model HI-1824 **BLO-CORE** *Automatic*

## SHELL MACHINE

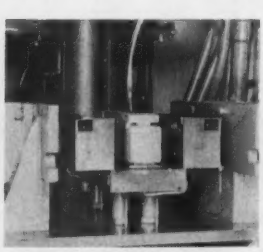
**SHELL CORES—SHELL MOLDS EVERY 30 SECONDS**

- Core Boxes Up to 15" x 20" x 30" High
- Mold Boxes Up to 20" x 30" x 16" Draw
- Horizontally-parted Mold Boxes
- Vertically Split Core Boxes
- 4-part Draw Split Core Boxes
- Two Station Rotary Operations. NO OVENS.

Push the Button! The box closes and the "Blo-Core" cycle commences . . .



Rotating 180°, box is indexed under blow nozzles. Mix is blown into hot box. Curing starts immediately . . .



Returning to starting position, box is opened, shell is completely cured. Stripping operation completes cycle.

C&S

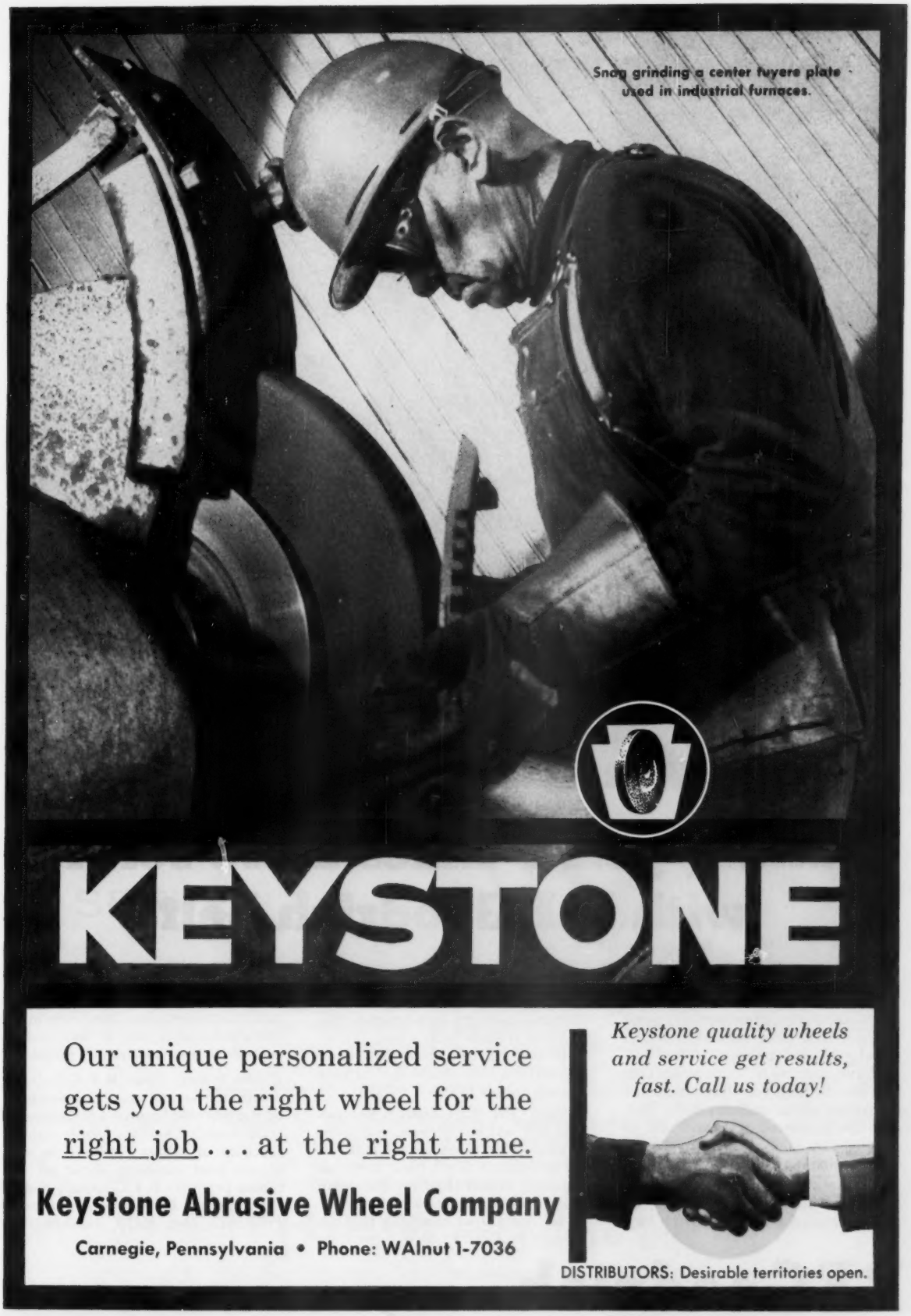
**PRODUCTS COMPANY**
INCORPORATED

Affiliated with Barber-Greene

**18656 Fitzpatrick Ave.**
**Detroit 28, Michigan, U.S.A.**



Circle 556 on Page 51




Our unique personalized service gets you the right wheel for the right job . . . at the right time.

**Keystone Abrasive Wheel Company**

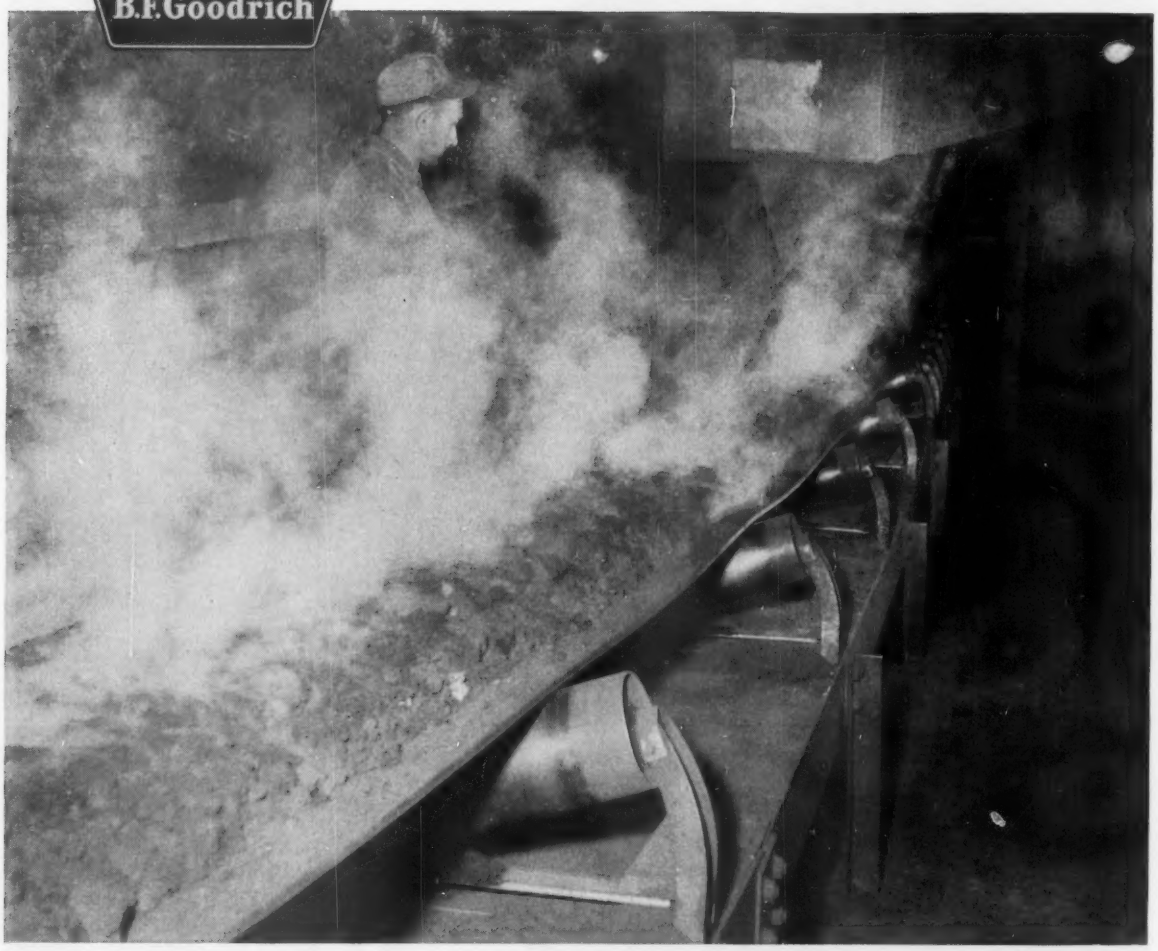
**Carnegie, Pennsylvania • Phone: WAlnut 1-7036**

*Keystone quality wheels and service get results, fast. Call us today!*



DISTRIBUTORS: Desirable territories open.

B.F.Goodrich



# Foundry gets 3-times more service with B.F.Goodrich belt

***B.F.Goodrich improvements in rubber brought extra savings***

*Problem:* Steaming hot sand and metal scraps shaken from the molds at this foundry fall into a hopper (top of picture) and then are fed onto a conveyor belt. But the heat charred and hardened the rubber on an ordinary belt. This, plus the continued wear and tear of tons of hot sand and sharp, jagged metal ruined it after one year's service.

*What was done:* When a B.F.Goodrich distributor heard of the problem, he recommended a B.F.Goodrich belt that's made to carry such hot materials. This belt is made with a special heat-resisting rubber that can stand temperatures that would char or burn ordinary rubber belts.

*Savings:* The B.F.Goodrich hot material belt was put to work and lasted 3 years—three times longer than the belt it replaced. Even then, it was an accident, rather than regular wear, which made it necessary to replace it.

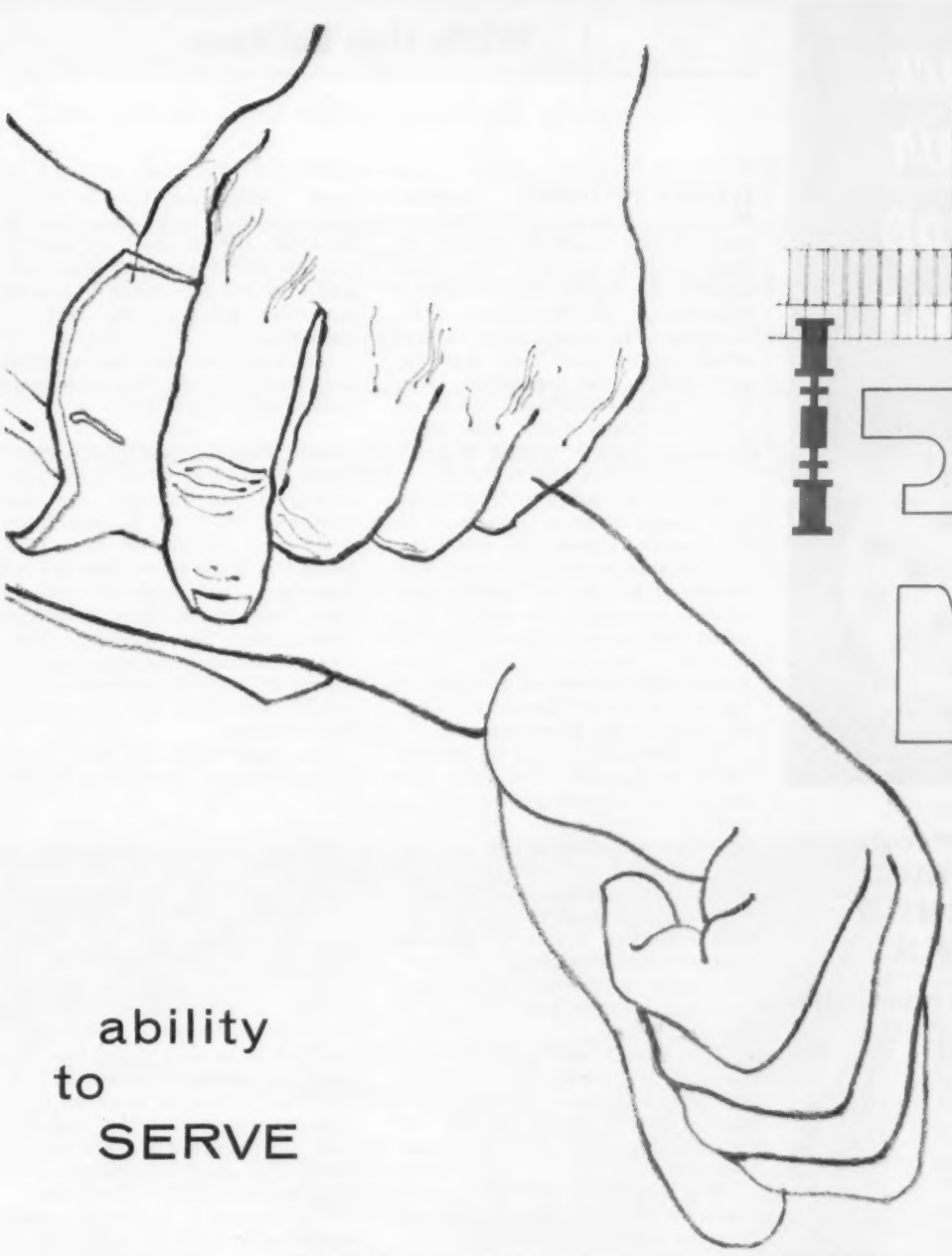
"No one knows how long this belt might have lasted if it hadn't been accidentally ripped," says the plant's head of maintenance. "And even in its damaged condition, it was tough enough to run another 18 months."

*Where to buy:* Your B.F.Goodrich distributor has the exact specifications on the belt that improved performance at this foundry. And, as a factory-trained specialist in rubber products, he can answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M479, Akron 18, Ohio.*

**B.F.Goodrich** ***conveyor belts***



Circle 558 on Page 51



ability
to
SERVE

Your Thiem man, with experience and knowledge of core and mold-making, has one aim — *to serve you* in improving casting surfaces. He is ready to roll up his sleeves and go to work right in your foundry to help solve an immediate problem.

Backed by the Thiem laboratory, most up-to-date in the industry devoted to development of core and mold-making products, he has the answer to improving your production and casting quality.

**THIEM PRODUCTS INC.**

MILWAUKEE 19, WISCONSIN

*Manufacturers of foundry products exclusively*



Circle 559 on Page 51

with
Porcelain Products
CERAMIC
STRAINER
CORES

SAVE WITH THESE STOCK SIZES:

| P.P. Inc. No. | Dia. | Thickness | No. of Holes | Hole Dia. |
|---|---|---|---|---|
| 1-CAA | 1" | 5/16" | 3 | 1/8" |
| 175-EED | 1¾" | 3/8" | 7 | 1/4" |
| 175-GHD | 1¾" | 7/16" | 10 | 1/4" |
| 175-GFD | 1¾" | 7/16" | 8 | 1/4" |
| 2-IGD | 2" | 1/2" | 9 | 1/4" |
| 2-EHD | 2" | 3/8" | 10 | 1/4" |
| 213-GGD | 2⅛" | 7/16" | 9 | 1/4" |
| 225-EFF | 2¼" | 3/8" | 8 | 5/16" |
| 225-ENC | 2¼" | 3/8" | 16 | 1/32" |
| 25-END | 2½" | 3/8" | 16 | 1/4" |
| 275-GRD | 2¾" | 7/16" | 19 | 1/4" |
| 3-INF | 3" | 1/2" | 16 | 5/16" |
| 3-GPF | 3" | 7/16" | 18 | 5/16" |
| 35-GRF | 3½" | 7/16" | 19 | 5/16" |
| 35-GRH | 3½" | 7/16" | 19 | 3/8" |
| 35-INH | 3½" | 1/2" | 16 | 3/8" |

WRITE TODAY for free samples and informational folder.

64 years PP INC.
Porcelain Products, Inc.
CAREY, OHIO

Circle 560 on Page 51


# With the Editors

**DESIGN BY CAINE:** Technical people, both in production and sales, found much of interest in Jack Caine's article, "The Case Against the Tension Test," when it appeared in the November, 1957, issue of FOUNDRY. In a second article under the same heading, presented in the September, 1958, issue, Jack introduced ideas on which he hopes a new and better understanding of casting strength and serviceability can be built.

Because the subject of properties and design seem so important to the foundry industry at this time, and because so much interest was developed by the two articles previously presented, the editors have asked Jack to undertake a series of discussions on the subject. These articles will be presented under the broad heading of "Design for Casting and for the Foundryman."

The first section will be presented in the January, 1959, issue. For the benefit of castings salesmen as well as metallurgists, the author considers the properties of moment of inertia and section modulus and indicates misconceptions that arise in specifying these properties. He also considers radius of gyration used to evaluate resistance to buckling under compressive strength and torsional moment used to measure twisting stress.

The second article of the new series, to be presented in the spring of 1959, will cover fatigue properties of cast section junctions and will provide data on stress concentrations.

The third article will advance the author's concept of cast sections that fit in with the fundamentals covered in the first and second articles of the series.

FOUNDRY editors hope you will be watching for these articles prepared by a leading authority in the field.

—o—

**The Institution:** In commenting on the 25th anniversary of *Newsweek* and his association with the magazine for that period, Raymond Moley closed with the following paragraph:

"But those of us who fashion this book are, after all, the shadows. The institution is the substance. We are trustees not only of the past but of a future in a fiercely competitive world. What we have is an inalienable trust, never to neglect, to diminish, nor to lose. It belongs to those ahead who will labor here and who will read what *Newsweek* can offer them in the years to come."

My associates on the editorial and business staffs have the same feeling about FOUNDRY.

—o—

**Some Bum Guesses:** A contest to guess the weight of a 72-in., rubber-seated, cast butterfly valve was conducted by S. P. Kinney Engineers Inc., 201 Second Ave., Carnegie, Pa., at the recent Iron & Steel Exposition in Cleveland. H. L. Gary, master mechanic, American Shipbuilding Co., Lorain, Ohio, was the winner. He estimated the weight at 8360 lb and the actual weight was 8362 lb. A mighty close estimate.

But many were not even close. Guesses ranged from 29 to 200,000 lb.

—o—

**Selling Needed:** Regardless of what position you may hold in industry today, you should cultivate the art of salesmanship. This idea was expressed by Roy C. Ingersoll, chairman, Borg-Warner Corp., before an SAE meeting. As an illustration, he pointed out that while an engineer in the employ of an automobile manufacturer does not have an opportunity to sell his ideas to the car buyer, he must sell those ideas to someone in the organization. In his opinion, many a wonderful idea of an engineer has died a-borning and never contributed to the betterment of the world simply because that engineer did not have the ability to sell that idea.

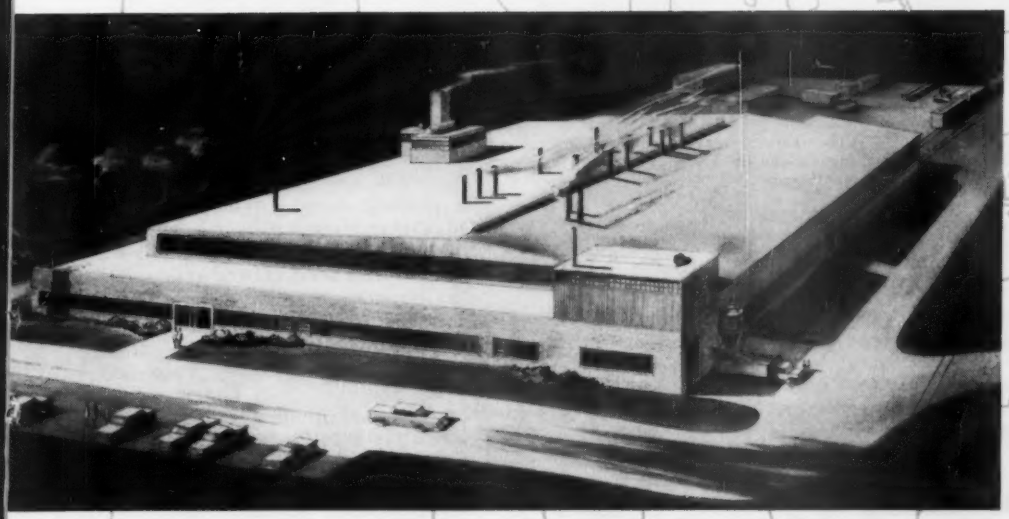
—o—

**Utah's Pioneers:** A recent issue of *SUP News*, published by the Sons of Utah Pioneers, presents an interesting article on how the residents of Cedar City, Utah, and Iron County are working with local chapters and national organizations of the Sons of Utah Pioneers to create a memorial park. The park would honor the sacrifices and achievements of the Iron County Mission of 1851-56 and mark the beginning of the iron and steel industry west of the Mississippi river.

The main feature of the memorial will be the restoration of the his-

***Now producing . . . Federated quality aluminum casting alloys from the world's most modern aluminum smelter.*** New convenience, faster service from the new Alton, Illinois plant and the same rigid quality controls that distinguish all Federated products. This modern smelter can produce every specification of aluminum alloy. And Federated field metallurgists back up every shipment of Alton aluminum ingot with on-the-spot assistance based on long experience. For a broad choice of aluminum casting alloys, call your nearest Federated sales office. There are 23 of them to serve you promptly. Federated Metals Division, 120 Broadway, New York 5. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

**FEDERATED METALS DIVISION OF**



**ASARCO**

AMERICAN SMELTING AND REFINING COMPANY

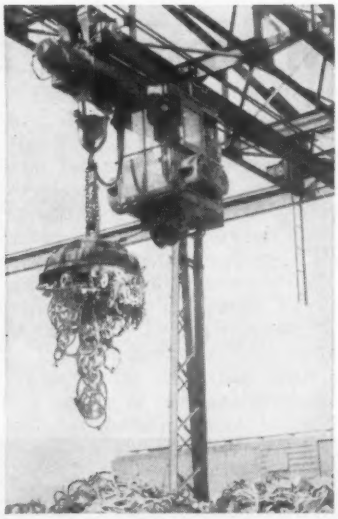
Circle 561 on Page 51

SHEPARD NILES
HOISTS

# CUT HANDLING COSTS

## in YOUR plant with the right hoist

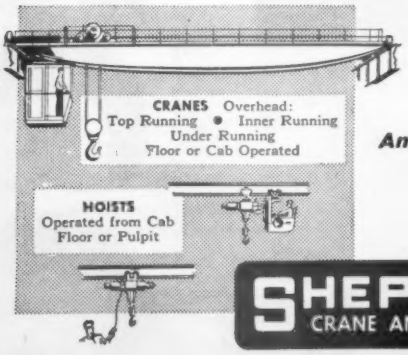
**FLOOR-OPERATED HOIST**
Operator primarily occupied with other duties, uses hoist for fast, efficient short hauls.



**CAB-OPERATED HOIST**
Cab operator moves loads at high speeds, can quickly spot material for handling.

WHICH Shepard Niles hoist fits your plant's needs . . . a floor-operated hoist where the operator is freed for other duties or a cab-operated hoist where the operator is engaged full time moving loads through the air? Shepard Niles manufactures both types in capacities from 1 to 20 tons.

Send for the descriptive bulletins on both Cab and Floor Operated Hoists . . . or ask that a Shepard Niles representative call — there's NO OBLIGATION.




*Building*
*America's Most Complete Line of Cranes and Hoists Since 1903*

SHEPARD NILES
CRANE AND HOIST CORPORATION
1395 Schuyler Ave., Montour Falls, N. Y.

toric 1854 Noble blast furnace, but the project also will include the restoration of the old pattern shop and the molding shop. The article also presents a photograph of the remains of the John J. Jones cupola furnace on the desert at Enoch, about 6 miles from Cedar City.

The development of this memorial and museum will be watched with interest.

—o—

**It Takes Push:** A news report from Detroit presented in the "Around the Country" department of the October issue included the following:

"Two of the principal reasons why automotive companies are interested in aluminum for functional automobile parts are light weight and easy machinability. Ultimate cost savings are inherent in both factors. But some force had to create sufficient interest in aluminum to overcome the natural inertia of any organization to continue using metals for which it has extensive production facilities.

"That force was the aluminum producers, who for years have sponsored engineering research and development programs to expand the use of that light metal. Results of those programs repeatedly are presented to potential customers."

As reported in the November issue, the Gray Iron Founders' Society included a discussion of the use of aluminum castings by the automobile industry at its recent annual meeting in Washington. How well one aluminum producer is pushing every possible angle or advantage is shown by the following telegram sent to business paper editors, wire services, and others in Washington the night before presentation of the technical paper:

"We invite your attention to a speech which will be made in Washington, D. C., Thursday by two General Motors engineers before Gray Iron Founders Society on the increased importance of aluminum for use in the automotive industry. Their statement that improved manufacturing techniques have made aluminum highly competitive with cast iron from cost standpoint is the most encouraging news since GM's announcement in June of successfully tested experimental aluminum engine blocks. Please note that this speech is being released by General Motors for p.m. papers of Thursday, Oct. 9."

Producers of ferrous metals might take a lesson from their contemporaries in the field of light metals.

F.G.S.

# Spend just Pennies Per Cupola Charge for *Famous* CORNELL CUPOLA FLUX

## Shake Dollars out of Your Melting and Pouring Costs

• Gray iron foundries and Malleable foundries with Cupolas have found Famous Cornell Cupola Flux is the easy, economical way to improve iron quality and cut cupola maintenance costs. Scrap losses are less, castings are easier to machine and the increased lining life in cupolas and ladles more than pays the cost of using Famous Cornell Cupola Flux.

Write for Bulletin 46-B

**Advantages of Famous CORNELL Aluminum and Brass Flux**

- Makes metal pure and clean.
- Permits use of more scrap without as much danger of dirt, porous places or spongy spots, due to dirty metal.
- Thinner, yet stronger sections can be poured.
- Metal does not cling to the dross as readily.
- Crucible or furnace linings are kept clean and preserved.
- Cleanses molten brass (whether red or yellow) even when the dirtiest brass turnings are used.
- Saves considerable tin and other metals.
- Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases to a great extent.

Write for Bulletin 46-A

*don't accept substitutes*

**The CLEVELAND FLUX Company**

**1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO**

*Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918*

FAMOUS CORNELL FLUXES

Trade Mark Registered

# HERMAN MOLD

## they've made their way by the way they're made . . . 5 ways!

**1. LIAISON ENGINEERING**

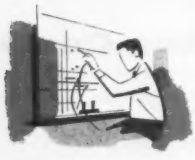
A unique principle which guarantees a constant flow of practical information between our Sales Representatives in the field, and our plant engineering staff.

**2. ASSEMBLY AND TESTING**

Each and every Herman molding machine is completely assembled, operated, and inspected, before it leaves our plant.

**3. CAREFULLY SPECIFIED COMPONENT PARTS**

90% of the components in our molding machines are cast, for durability and long life. On selected steel castings, we take off a cut, inspect and re-anneal. We insist on high quality in *all* our components, which assure our customer of a high quality finished product.

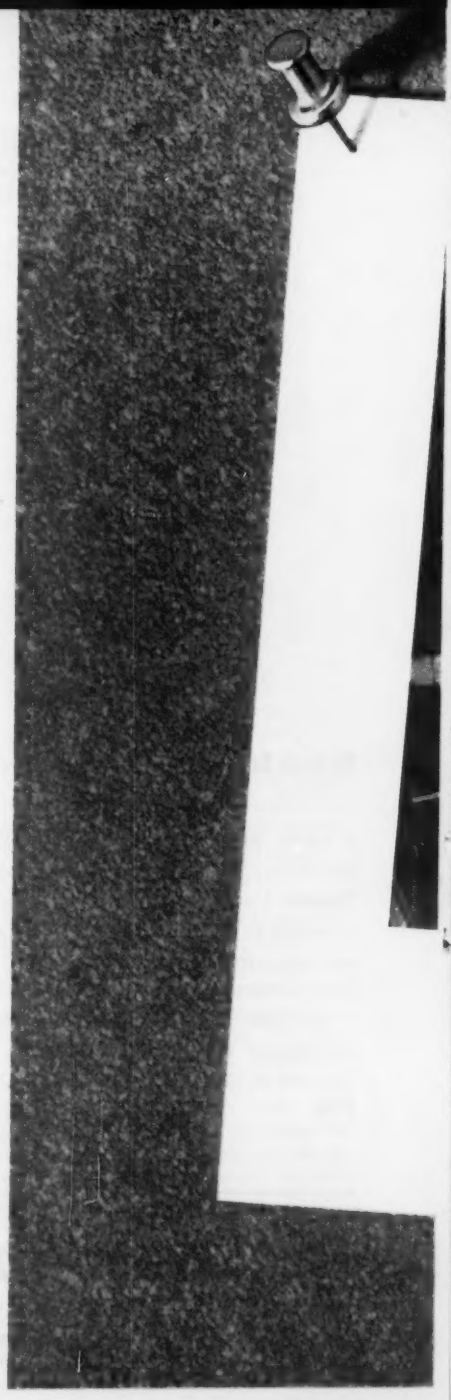


**4. ELECTRICAL AND HYDRAULIC EQUIPMENT**

Herman Molding Machines contain dust-proof solenoid valves, relays, limit switches, and central control panels, built to JIC standards. Packaged bearings have up-to-date seals. Push-buttons are rubber covered.

**5. SERVICE**

An integral part of our reputation is this matter of SERVICE. Installation and start-up service, service which guarantees the machine will operate to the customer's satisfaction, and service at all times to assure efficient and productive machine operation.

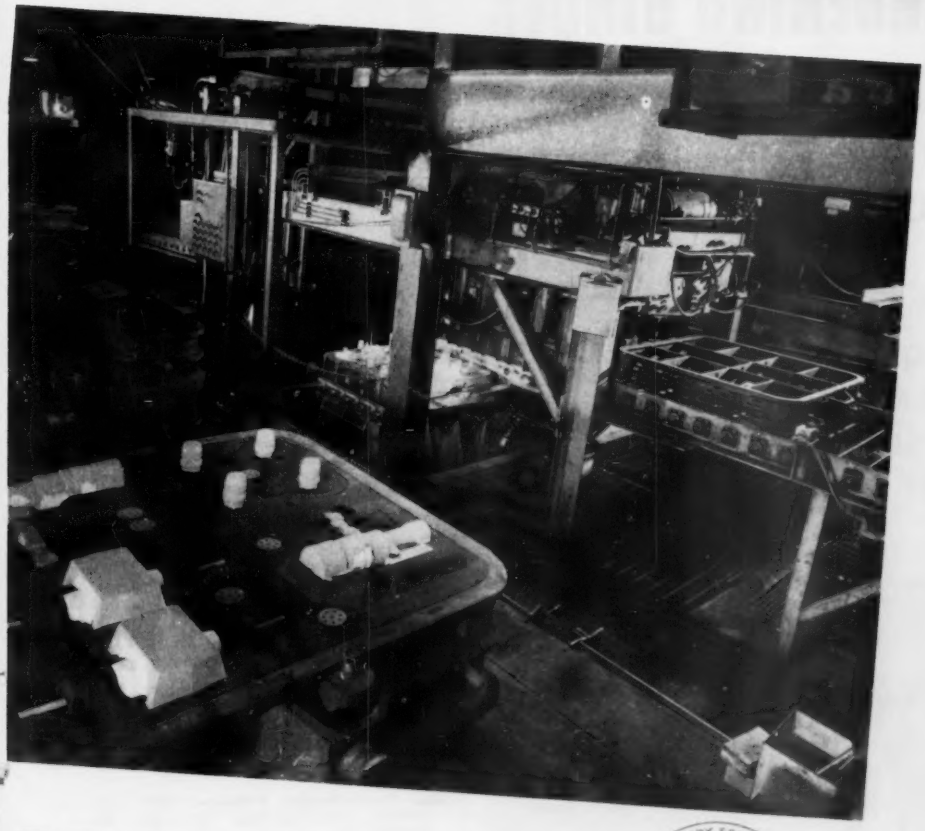


**All five of these reasons, individually and together, combine to give a Herman customer true meaning to the phrase "They've Made Their Way By The Way They're Made."**

**May we hear from *you* today?**

HERMAN PNEUMATIC MACHINE CO.
UNION BANK BUILDING, PITTSBURGH 22, PA.

# ING MACHINES



**HERMAN**

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

**Best Known Name in Molding Machines**




Circle 564 on Page 51

NOW! save up to 50%

in BINDER COST with

# NEW STEINEX

## SLOWER-HARDENING BINDER

**Specifically designed for BENCH WORK and CORE BLOWER use**

CarVer FOUNDRY PRODUCTS
Muscatine, Iowa

Please rush information and prices on new Steinex binders.

NAME TITLE

FOUNDRY

CITY STATE


# Calendar of MEETINGS

**Dec. 1-5—American Society of Mechanical Engineers,** Power and Mechanical Engineering Exposition, New York Coliseum, New York.

**Dec. 3—Foundry Facings Manufacturers Association,** annual meeting, Waldorf-Astoria Hotel, New York.

**Dec. 3-5—American Institute of Mining, Metallurgical, & Petroleum Engineers,** Electric Furnace Conference, Statler Hotel, Detroit.

**Dec. 7-9—Material Handling Institute,** annual meeting, Roosevelt Hotel, New York.

**1959**

**Jan. 16—Malleable Founders' Society,** industry meeting, Hotel Cleveland, Cleveland.

**Jan. 19-20—Industrial Heating Equipment Association,** annual meeting, Hotel Cleveland, Cleveland.

**Jan. 22—Hoist Manufacturers Association,** annual meeting, Palm Beach Biltmore, Palm Beach, Fla.

**Jan. 26-29—Plant Maintenance & Engineering Show and Conference,** Public Auditorium, Cleveland.

**Feb. 2-6—American Society for Testing Materials,** Committee Week, Penn-Sheraton Hotel, Pittsburgh.

**Feb. 12-13—Wisconsin Regional Foundry Conference,** Schroeder Hotel, Milwaukee.

**Feb. 15-19—American Institute of Mining, Metallurgical, & Petroleum Engineers,** annual meeting, San Francisco.

**Feb. 19-20—Southeastern Regional Foundry Conference,** Hotel Tutwiler, Birmingham.

**Feb. 18-19—Malleable Founders' Society,** Technical and Operating Conference, Wade Park Manor Hotel, Cleveland.

**March 9-10—Steel Founders' Society of America,** annual meeting, Drake Hotel, Chicago.

**March 13-14—California Regional Foundry Conference,** Huntington Hotel, Pasadena, Calif.

**March 16-20—American Society for Metals,** plus other technical groups, Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles.

**March 18-19—Foundry Educational Foundation,** annual College-Industry Conference, Statler-Hilton Hotel, Cleveland.

**March 19-20—Texas Regional Foundry Conference,** Menger Hotel, San Antonio, Tex.

**April 8-9—Malleable Founders' Society,** Market Development Conference, Hotel Cleveland, Cleveland.

**April 13-17—AFS Castings Congress & Engineered Castings Show,** Hotels Sherman and Morrison, Chicago.

**May 13-15—National Industrial Sand Association,** annual meeting, Homestead, Hot Springs, Va.

**May 25-26—Malleable Founders' Society,** annual meeting, Homestead, Hot Springs, Va.

**June 21-26—American Society for Testing Materials,** annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

**June 25-27—Penn State Foundry Conference,** Pennsylvania State University, University Park, Pa.

**Sept. 21-22—Steel Founders' Society of America,** fall meeting, Homestead, Hot Springs, Va.

**Oct. 7-9—Gray Iron Founders' Society,** annual meeting, Fairmont Hotel, San Francisco.

**Oct. 11-16—American Society for Testing Materials,** Pacific area national meeting, Sheraton-Palace Hotel, San Francisco.

**Oct. 15-17—Foundry Equipment Manufacturers Association,** annual meeting, Greenbrier, White Sulphur Springs, W. Va.

HINES POP-OFF FLASK

# HINES MEDIUM "POP-OFF" FLASKS

*These versatile, medium-weight flasks are heavy enough for all types of machine production jobs, within size range, yet light enough to handle on the bench.*

*One of many* **HINES** *developments contributing to better foundry production*

- Jig and fixture built for maximum accuracy and strengthened with the familiar HINES diagonal ribs.
- No need for hammering to remove the flask from the mold — simply move levers and off it pops!
- Two-part flasks equipped with standard "POP-OFF" locking assemblies. Flasks with one or more upsets (3″ or deeper) equipped with new clevis-locking assemblies for *simultaneous opening of all flask sections.* (See upper photo.) Also recommended for flasks used with cope and drag pattern plates and flasks used on "Rota-Lift" machines.
- Lengths and widths from 10″ to 24″. Depths from 7½″ to 14″. Single or double, round, hex or "V" pins, bushings or guides—or pads for your own pins.

*WRITE FOR CATALOG FOLDER NO. 205*

**THE HINES FLASK CO.**

**3431 WEST 140th STREET • CLEVELAND 11, OHIO**

**HINES FLASKS**



Circle 566 on Page 51

# let's take a second look at air compressor costs

Let's look at what Joy compressors have to offer in saving you money where it counts the most. Let's assume that all compressors are competitively priced . . . and go on from there.

**eagle-eye the installation first** . . . here's where specifying Joy saves a bundle. Why? Because Joy stationary compressors are "Packaged" units. They're shipped complete, ready to run without tedious, costly site assembly. Joy compressors need as little as one-half as much foundation. You can save up to $1000 on that item alone.

**plus savings in maintenance** . . . *All the wearing parts:* the cylinder liners, cross head guides, valves, etc., are replaceable at your plant, by your men. This is a Joy exclusive. No specialists needed, no fancy tools required. Joy engineered these compressors to run for years on minimum maintenance.

**and on operation,** we'll let the people who have used Joy compressors for years do our telling for us. Nope—no modesty . . . but the money they've saved in operating costs annually would sound unbelievable coming from us.

*If you're frowning over the choice of your next compressors and what to do to save a needed buck . . . . . .*

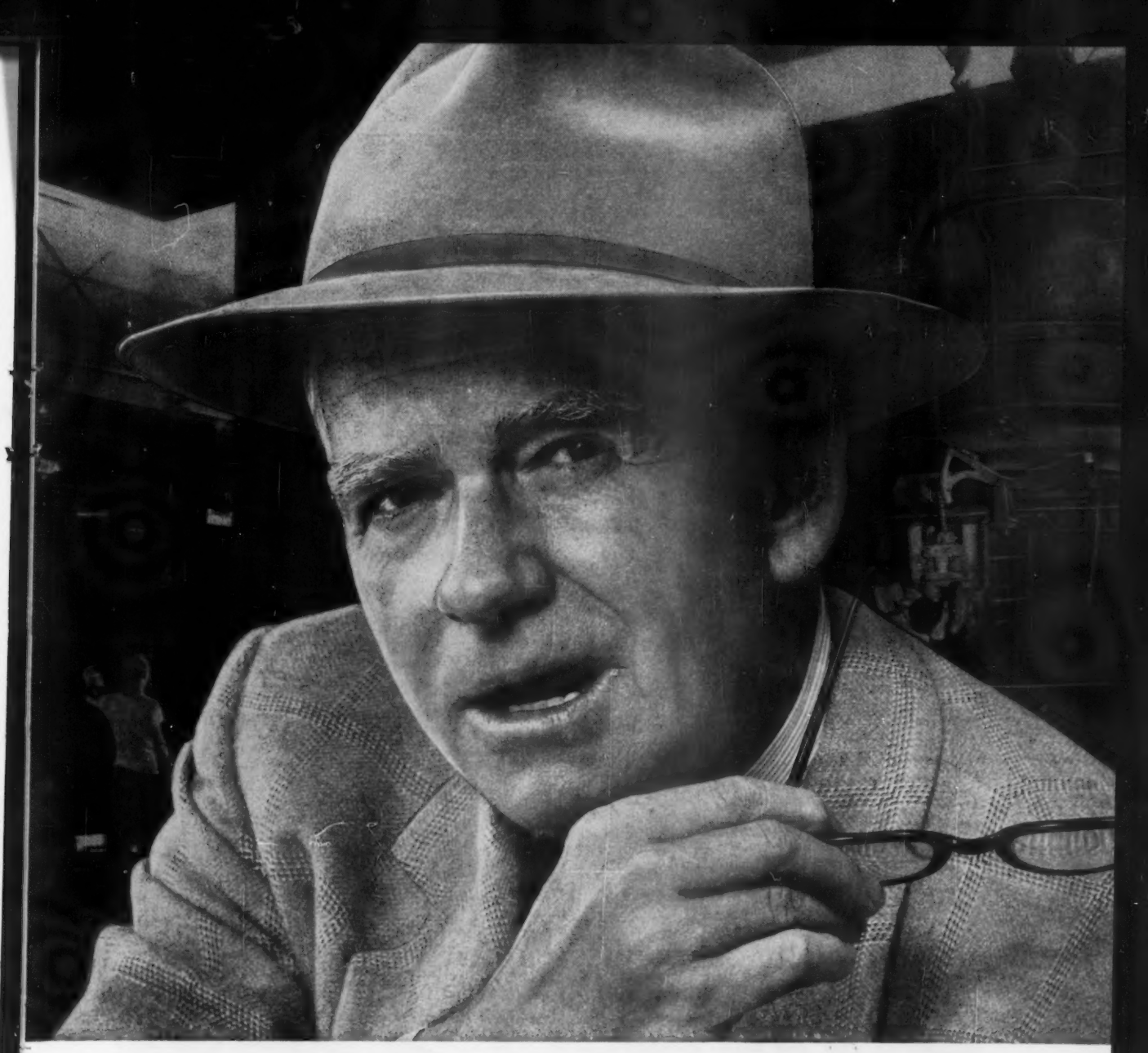
**Take a second look** and get in touch with a Joy Engineer. He'll show you how Joy saves you money on air. Write Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

WSW I 7165-243

**WRITE FOR FREE BULLETIN 243-13**

**JOY SAVES YOU MONEY ON AIR**

**COMPRESSORS • FANS • DUST COLLECTORS**



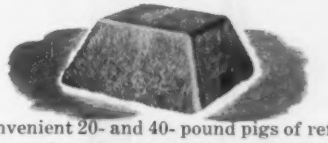
# *"We use only one chrome—refined charge chrome"*

Iron and steel foundry operators are cutting chromium costs by using ELECTROMET's new low-cost refined charge chrome for all high-carbon chromium additions. Inventory, handling, and storage are greatly simplified by stocking only this one high-carbon chromium alloy. It is ideal for use as:

- **A charge material for basic-melted stainless steel.**
- **Final additions for alloy steel castings.**
- **Cupola or ladle additions for cast iron.**

Refined charge chrome combines the economy of regular charge chrome with the maximum cleanliness and low residual element content of conventional high-carbon ferrochrome. For facts on how refined charge chrome can reduce your costs, contact your ELECTROMET representative.

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.



Convenient 20- and 40- pound pigs of refined charge chrome are magnetic, allowing easy handling with an electromagnet. Crushed sizes are available for ladle additions.

**Electromet**
FERRO-ALLOYS AND METALS

UNION CARBIDE

The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Circle 568 on Page 51

# HANSBERG *Shooters*®

WILL GIVE YOU **BETTER CORES**

IN LESS TIME — AT LOWER COSTS.

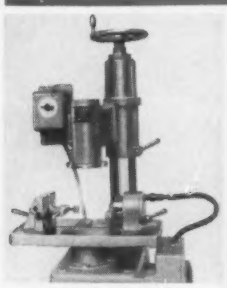
## The NEW HANSBERG Core Shooters

### Models (H5A) (H12A) (H25A) (H80A)

### fully automatic with NEW vibratory sand feeders

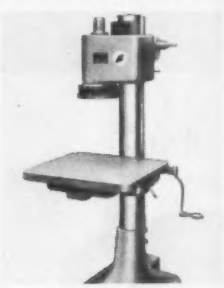
Fully automatic, push-button controlled, synchronized with exclusive automatic SAND CHARGER, new improved VIBRATORY FEEDER actuated by a patented device inside sand reservoir. Quick interchangeable shoot heads, RAPID CHANGE OF CORE BOXES, adjustable table height hydraulically operated, telescoping cylinders ground to closest tolerances allow wide range of clamping and drawing of core boxes, sand reservoir stationary can not get out of line with the table as in old fashioned core blowing machines with movable sand reservoir. No agitators as in sand blasting core blowers — HEAVIEST SANDS POSSIBLE, the ideal machine for CO2 sands since no partial precuring of CO2 mix in the machine as in blowers. SAFETY FEATURES prevent shooting unless machine is filled with sand.

Hansberg Shooter Model H-12A



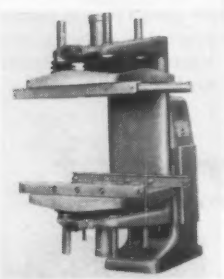
Bench Model $CO_2$ Hardener

Hansberg $CO_2$ HARDENING MACHINES model's (K1A8) (K1A12) (K1A20) (K1A28) are fully automatic, pushbutton controlled with adjustable gas-timing — 1 to 20 seconds.

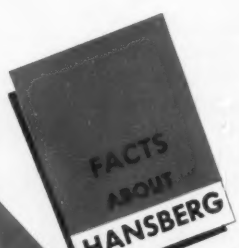


Floor Model $CO_2$ Hardener

FULLY AUTOMATIC ROLL-OVER and DRAW MACHINES model (W-2) push-button control.



Roll-Over and Draw Machine




SEND for "FACTS about HANSBERG SHOOTERS," learn about the difference between core blowing and core shooting, why the SHOOTER is a "MUST" for the $CO_2$-Process, etc.

**HANSBERG** *Shooters*® INC.

PHONE UNIVERSITY 4-6565

3213 CENTRAL STREET
EVANSTON, ILL. U.S.A.

Don't miss Alistair Cooke . . . and Omnibus—every other Sunday afternoon.
See your local newspaper for time and channel (NBC-TV, 5-6 P.M., E.S.T.)

## Again this season, Aluminium Limited presents television's most widely acclaimed program

FOR THE FIFTH CONSECUTIVE SEASON, Aluminium Limited is proud to sponsor Omnibus . . . a program that has to its credit 65 major awards, ten of these received just last year.

Every other Sunday, Alistair Cooke acts as host to more than 14 million viewers, introducing the wealth of talent and material that is Omnibus. Gene Kelly, Esther Williams, Leonard Bernstein, Joseph Welch, Peter Ustinov and many others—will bring you the unusual presentations that make Omnibus the ultimate in television entertainment.

This year, Aluminium's filmed reports dramatize the nation's growing needs for aluminum. Industrial leaders take us behind the scenes in industry after industry . . . show us new products . . . exciting new ideas that will soon be translated into aluminum. And implicit in every message are the advantages that aluminum brings to a host of products for home, recreation and industry.

In this way, Aluminium Limited continues to stimulate greater use of aluminum, greater demand for the products made by our customers—the nation's leading independent aluminum fabricators.

**Aluminium**
**Limited**

*Ingot Specialist*...serving
American Aluminum Fabricators—

*In the U.S.*—Aluminium Limited Sales, Inc.
630 Fifth Avenue, New York 20, N.Y.
CLEVELAND • CHICAGO • LOS ANGELES • DETROIT • ATLANTA
*Additional distribution* (Alcan Foundry Alloys):
Apex Smelting Company, Chicago, Cleveland, Los Angeles
Charles Batchelder & Company, Botsford, Conn.

Circle 570 on Page 51

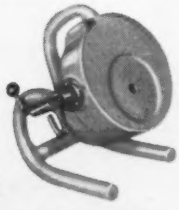
NEW

# CURTISS-WRIGHT

## RADIOGRAPHIC

# PUFF CAMERA

**Rapid source advance to remote areas... Complete operator safety... No film fogging**



**ALL-PURPOSE CAMERA • 10-2** Handles 20 curies of iridium. Small, rugged and compact for hand portability. Capable of 60 degree beam or panoramic exposure.

**EXTERNAL PIPE LINE CAMERA 10-1** Handles 25 curies of iridium. Designed for safety and accuracy in field exposures. Has remote-controlled automatic timer. Weight under 45 lbs.

**CURTISS-WRIGHT GAMMA CAMERAS**

| | MODEL | CURIE STRENGTH | FOCAL SPOT SIZE |
|---|---|---|---|
| 10—1 | External Pipe Line | 25 Curies Ir 192 | .062 x .176″ |
| 10—2 | Gen'l Purpose Camera | 25 Curies Ir 192 | .062 x .176″ |
| 10—4 | Shop Camera | 2 Curies Co 60 | .125 x .125″ |
| 10—4A | Shop Camera | 10 Curies Co 60 | .125 x .250″ |
| 10—5A | Puff Camera | 30 Curies Ir 192 | .062 x .176″ |
| 10—5B | Puff Camera | 100 Curies Ir 192 | .187 x .280″ |
| 10—5C | Puff Camera | 2 Curies Co 60 | .125 x .125″ |
| 10—5D | Puff Camera | 10 Curies Co 60 | .125 x .250″ |

| | | BEST RANGE | |
|---|---|---|---|
| MODEL | HEAD WEIGHT | STEEL & BRONZE | LIGHT METALS (AL. & MAG.) |
| 10—1 | 43 lbs. | ⅜″-2½″ | 1″-2½″ |
| 10—2 | 45 lbs. | ⅜″-2½″ | 1″-2½″ |
| 10—4 | 340 lbs. | ¾″-6″ | over 3½″ |
| 10—4A | 850 lbs. | ¾″-6″ | over 3½″ |
| 10—5A | 44 lbs. | ⅜″-2½″ | 1″-2½″ |
| 10—5B | 180 lbs. | ⅜″-2½″ | 1″-2½″ |
| 10—5C | 390 lbs. | ¾″-6″ | over 3½″ |
| 10—5D | 900 lbs. | ¾″-6″ | over 3½″ |

With the new Curtiss-Wright Puff Camera, pressure vessels, castings, ship holds, nuclear installations, pipe lines and other critical structures can be radiographed with high strength sources from remote locations with complete operator safety.

The flexible steel reinforced tubing and small source head can be introduced through small openings and can be coiled up like a garden hose if necessary. The source can be exposed from a distance of 100 feet in less than 2 seconds at the press of a button. The rapid source action reduces operator exposures and eliminates costly film fogging. Works from plant air supply or nitrogen cylinder. Write for complete technical details.

PRINCETON DIVISION

**CURTISS-WRIGHT**

CORPORATION • PRINCETON, N. J.



Circle 571 on Page 51

**INTERNATIONAL AUTOMATIC CORPORATION** 121 HURON VIEW BLVD., ANN ARBOR, MICH.

# *The new Buhrer sand cooler will give you:*

## IMPROVED CASTING QUALITY

A clean pattern draw is obtained even with minimum draft angles. The sticking of the sand to the pattern plate, and the resulting casting defects are eliminated. Casting defects resulting from cold cores placed into hot molds disappear completely.

## HIGHEST MULLING EFFICIENCY

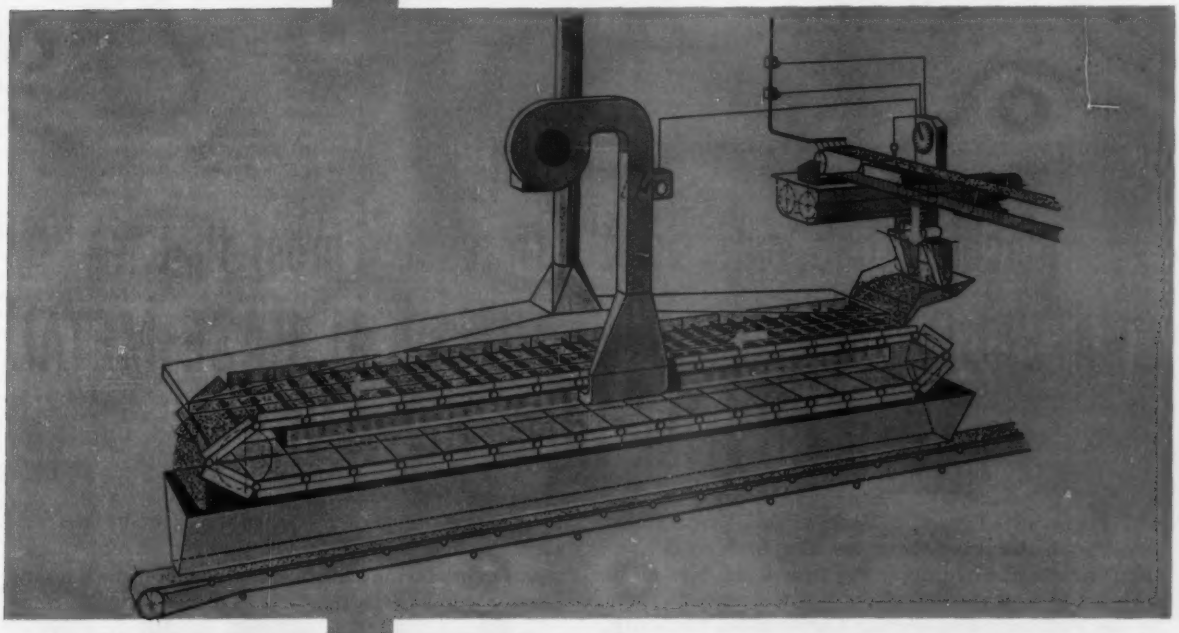
Practically all "live bond" contained in the return sand remains available for re-bonding purposes. In addition, cool sand requires less bond with mixing time reduced. The use of cool sand at controlled low temperature and moisture is a prerequisite for automating the mulling cycle.

## BEST POSSIBLE CONTROL OF SAND PROPERTIES

The use of a cool sand in the muller results in consistently accurate batch volume; no condensation, therefore, no build-up muller or weighing device. The re-conditioned sand reaches the molding stations in the same controlled condition, because evaporation losses of the sand between mill and molding stations are kept at an absolute minimum.

## HIGHEST RECLAMATION YIELD

No "fines", therefore, no reusable binders are lost. The "BUHRER" COOLER cools the hot sand immediately after shake-out. The return sand reaches the reconditioning equipment in a "screenable" condition at controlled low temperature and moisture.



IAC

## INTERNATIONAL AUTOMATION CORPORATION

121 HURON VIEW BOULEVARD ANN ARBOR, MICHIGAN PHONE—NORMANDY 2-1342

*Gentlemen: Please send me, without any obligation, a free copy of your bulletin SC-80.*

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....CITY .....STATE .....



*Circle 572 on Page 51*

**CHATEAUGAY PIG IRON ADDS STRENGTH, WEAR-RESISTANCE, EXCELLENT MACHINABILITY** to ductile iron cast parts in the Fitchburg Chipper. The unit pictured can chew wood up to 4½" in diameter. Other models can take wood up to 8" in diameter.

## Machine that "eats wood" offers more proof that...

# CHATEAUGAY PIG IRON IS THE IDEAL BASE METAL FOR DUCTILE IRON CASTINGS

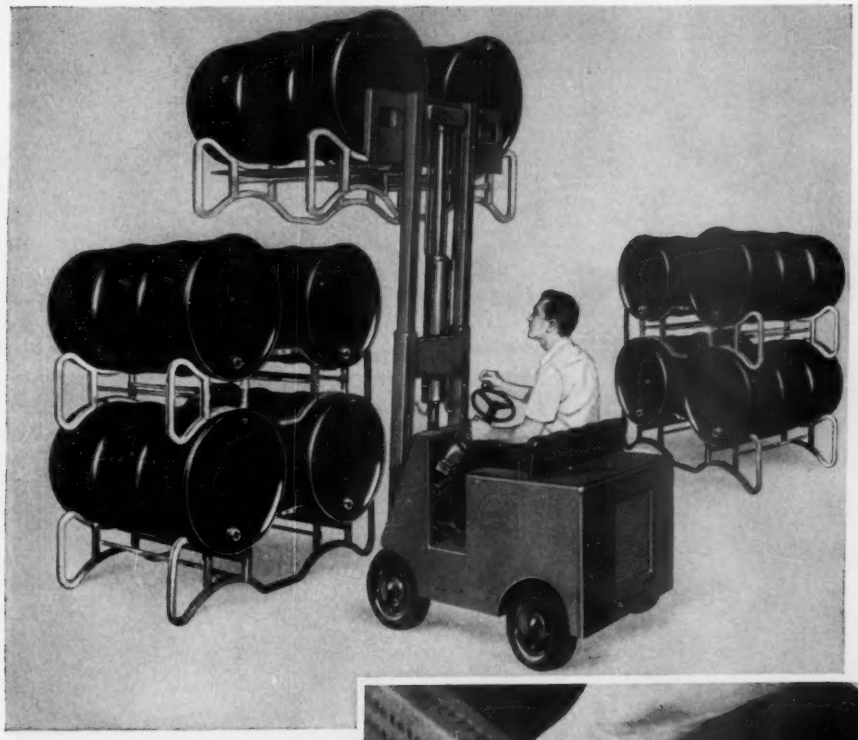
The Fitchburg Chipper, a machine that literally eats wood, is another example of the many benefits derived from the use of Chateaugay Pig Iron as the base metal for ductile iron castings. Designed and manufactured by the Fitchburg Engineering Corporation, Fitchburg, Mass., the machine is used by municipalities, utilities, farmers, and tree surgeons for on-the-spot disposal of wood wastes.

Many of the Chipper's parts, such as cutter head, feed plate, drive shaft, and frame are ductile iron castings. For increased strength, good surface, high wear-resistance, and better machinability, these parts are cast with Chateaugay as the base metal.

Chateaugay is perfectly suited for ductile iron use because of its high total carbon and unusually low phosphorus, silicon, and manganese content. The uniform distribution of chemical elements in Chateaugay assists in producing a dense grain structure which results in excellent wear-resistance and economical machining.

A Republic Pig Iron Metallurgist will give all the facts on Chateaugay for ductile iron use as well as complete details on other Republic Irons. Republic, only producer of both Northern and Southern Iron, offers industry's most complete line of merchant pig irons. Northern grades include Malleable, Bessemer, Foundry, and Basic. Southern furnaces produce Foundry and Basic.

Send the coupon today for prompt, expert metallurgical service, or for more information on Republic's complete line of irons.



**REPUBLIC PROVIDES THE IDEAL WAY TO STACK DRUMS.** This new portable drum rack, designed and manufactured by Republic's Berger Division, can accommodate more in-use drums in less floor space than was ever before possible. Each steel cradle supports two loaded 55-gallon drums, permitting orderly stacking of pairs of drums to any practical height. Standard fork-lift trucks can pick up, move, and stack as many tiers of drums at one time as lifting capacity permits. Low in cost. Shipped knocked down flat with bolts for easy assembly. Send the attached coupon for more facts.

**HERE'S THE PRACTICAL AND IDEAL SOLUTION** for all your framing requirements. It's Republic METAL LUMBER®, the new slotted construction angle, designed and engineered by Republic's Berger Division. Use Republic METAL LUMBER for catwalks, supports, guard rails, special purpose tables and stands, scaffolding. Simply plan your layout, cut Republic METAL LUMBER, join with bolts. The secret is in the precision engineered, unique system of short slots, placed to allow ¾" vertical and horizontal adjustment. Republic METAL LUMBER is Bonderized and finished with baked enamel *after fabrication*. Shipped in convenient bundles of 10 angles, in .080 gage or .104 gage, 10- or 12-foot lengths. One bundle stores in same space as 2" x 4" piece of lumber. Send coupon for catalog packed with ideas.

# REPUBLIC STEEL

*World's Widest Range of Standard Steels and Steel Products*

**REPUBLIC STEEL CORPORATION**
**DEPT. FO-5504A**
**1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO**

☐ Have a Pig Iron Metallurgist call.

Send more information on:
☐ Chateaugay ☐ Northern Irons ☐ Southern Irons
☐ Drum Racks ☐ Republic METAL LUMBER

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____



Circle 573 on Page 51

SMOOTH, ACCURATE FINS require little or no cleanup. High accuracy is achieved, using only 5% Durez 18250 with sand.

**When foundry switches to shell molds . . .**

# Output of tricky castings jumps from 20 to 70 per day

More than three times as many castings per day—without added manpower.

That's what shell molding makes possible for Aluminum Matchplate Corp., Buffalo, N. Y.

It was a tough, slow job to produce the large finned aluminum-alloy gear-housing cover in sand. The heat-dissipating fins had a strong tendency to tear. As a result, three men produced only 20 castings per day.

In addition, sand did not provide the smoothness required on the edges of the piece. It was taking half an hour or more to file the rough edges of each casting.

After careful study, Aluminum Matchplate engineers switched to shell-mold castings for this job. Back of this decision was a solid six years of successful experience with shell molding employing Durez foundry resins.

Result: three men now turn out 70 castings per day. Finishing time is sharply reduced, too, because the shell-mold castings have much smoother surfaces. Dimensions are more consistent from one casting to the next.

The shell-mold castings achieve maximum engineering design, even permitting the incorporation of two more fins than originally planned.

### How to be more competitive

Does your foundry have the competitive edge that shell molding with Durez resins can give you? More and more foundrymen are taking the step to this fast, modern way of producing accurate shells and cores.

Your Durez technical man can help you get started. Foundry-trained and backed by 37 years of resin research and experience, he gets you over the rough spots and into production faster. Call him in soon.

**JUST OFF THE PRESS**—New "Durez Guide to Shell Molding" contains latest information on patterns, materials, mixing, temperatures, lubricants, molds, cores. Helps you evaluate shell molding for your foundry. Write for your copy today.

DUREZ® HOOKER CHEMICALS PLASTICS

**PLASTICS DIVISION**

HOOKER CHEMICAL CORPORATION

**1012 Walck Road, North Tonawanda, N. Y.**



Circle 574 on Page 51

# NEVILLE FOUNDRY COKE

NEVILLE Foundry Coke is scientifically processed from clean, washed coals containing a high percentage of Pocahontas. We provide this extra measure of quality at the very beginning of our foundry coke production. And it carries right through to help you produce more high quality castings.

*Neville* Foundry Coke is a dense, strong uniform coke, with more fixed carbon and less ash and sulphur. That's why it consistently provides maximum melting temperatures which enable you to produce a hotter, cleaner, more fluid iron.

**Neville Pig Iron and Neville Coke for the Foundry Trade**

If you're interested in improving the quality and increasing the efficiency of your gray iron castings production, specify *Neville* the next time you order foundry coke. *And if you need any technical help, our engineers will be glad to meet with your production people.*

COKE • CEMENT • PIG IRON • COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON

## Thinking of automation?

The Universal Mold Conveyor is typical Jeffrey automation equipment – moves molds on the level, up, down and around.

# **Jeffrey** builds single units and/or builds the entire system

Your men work at elevations best suited to each operation, with the Jeffrey universal mold conveyor on the job. Their tasks are eased and manufacturing efficiency is maintained at high levels, helping to boost earnings.

Flow of such materials as sand, castings, coke, limestone and iron borings is handled by Jeffrey vibrating feeders and conveyors, electric or mechanical types. They may serve as cooling conveyors, carrying castings from shakeout, and even the most fragile castings are handled safely.

Jeffrey mechanizes the handling of sand; overhead belt conveyors distribute sand to molders' stations, carry it from shakeout to Jeffrey sand conditioning plant and back to molders. Catalog 911 describes all of this foundry equipment. For a copy, write The Jeffrey Manufacturing Company, 907 N. Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

# THE NEW DEMMLER 70

## A YEARS-AHEAD DESIGN BLOWS OR SHOOTS ANY TYPE CORES FROM OUNCES TO 10 POUNDS IN WOOD OR METAL BOXES

**Latest Sleeve-Type Stationary Magazine:** Slot design for most efficient operation; suitable for all core sand mixes.

**Shoot Heads:** Interchanged in seconds; no wrenches needed.

**Quick-Change Blow Plate:** Cam-operated clamps; no wrenches needed.

**Horizontal Clamps:** Quickly adjustable, horizontally and vertically without wrenches.

**Fully-Enclosed Draw Mechanism:** Six-inch accurate draw stroke.

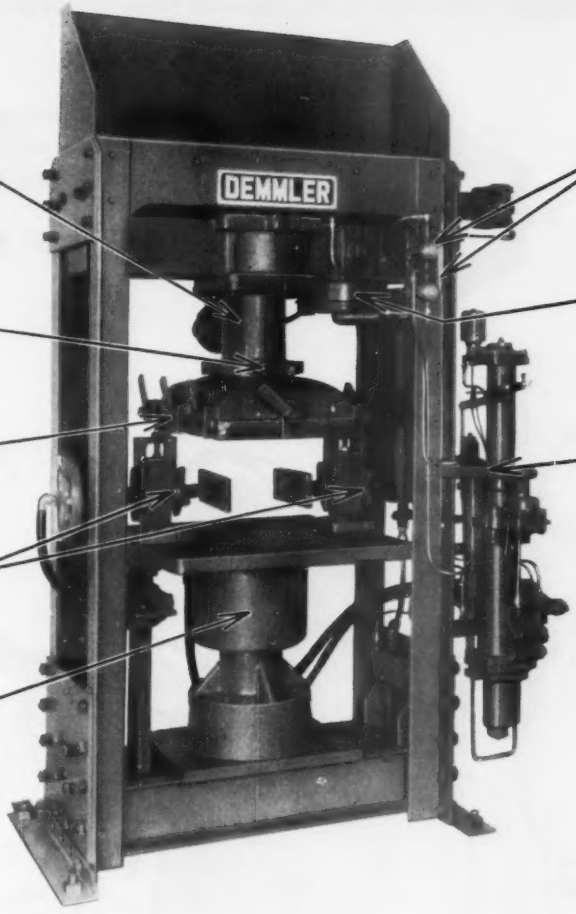



**Table Height Adjustment:** Push-button operated, eight-inch hydraulic adjustment.

**Fast-Acting Large Size Diaphragm-Type Blow Valve:** Easily replaceable diaphragms are the only wearing parts.

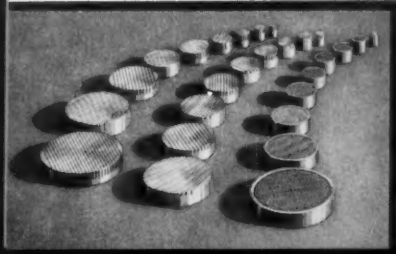
**Automatic Sequence Control:** One push of operating lever puts machine through a complete cycle.

**Safety Controls:** Machine is inoperative unless core box is properly located.

## GET MORE FROM YOUR FOUNDRY DOLLAR

**The new DEMMLER 70** is a low-cost, high-speed production machine, ruggedly constructed for heavy-duty use. Maximum versatility and ease of maintenance make this DEMMLER core blower a profitable addition for your foundry. Write us for more information. DEMMLER — since 1909 — the first name in core blowers.

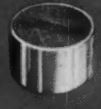
## DEMMLER MANUFACTURING COMPANY • KEWANEE, ILLINOIS



### PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

Circle 577 on Page 51



### HL 150 MESH VENTS

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.

Reserves are only part of the reason why Canada produces more than eighty per cent of the free world's nickel. More important than the reserves are the Canadians themselves. For Canada has bred a group of men who have made mining their lives. Men who spend their days and nights wresting ore from the earth and metal from the ore.

These are the men who have made Sherritt Gordon Mines Limited the third largest nickel producer in Canada. For them, mining was always a full time job. First copper mining, then nickel mining. Now they are blazing a trail in nickel refining. A new revolutionary process, developed by Sherritt, has captured the imagination of metals people the world over. And as the need for nickel has grown, so have the men of Sherritt expanded their facilities to meet it.

By adding a third skill to mining and refining, Sherritt enters a new era of growth and service. On September 1, 1958, Sherritt named Foote Mineral Company the sole sales agent for Sherritt nickel in the United States and Canada.

SHERRITT

nic

mined by SHERRITT

As Sherritt typifies the determination and devotion of the Canadian miner, so Foote typifies the concept of imaginative service of the American technical marketer.

Foote's entire history has been marked by a deep understanding and familiarity with the earth sciences. But going beyond mere understanding, Foote has used its knowledge to help customers expand the known markets. And entirely new markets have been opened for such materials as lithium and manganese.

The reputation won by Foote in the creative marketing of metals, minerals, and chemicals has now secured for Foote a new challenge . . . the exclusive sales agency for Sherritt nickel in the United States and Canada.

If you use nickel now . . . or if there's a promise that nickel might prove useful to you in the future . . . get in touch with Foote Mineral Company, 473 Eighteen West Chelten Building, Philadelphia 44, Pa.

**kel**

**marketed by FOOTE**

Circle 578 on Page 51

## *Eight good reasons why you should buy*

# THE BELLOWS AIR MOTOR

### *—the air cylinder with the built-in valve*

- **no extra valves—all operating controls are built-in**
- **choice of valve types: low voltage, JIC, pilot-actuated, mechanically actuated**
- **responds to starting impulse instantly—no lag, no stutter**
- **fits well in tight quarters, on moving machine elements**
- **no cumbersome piping, requires only a single air connection**
- **available in five bore sizes: 1¼, 1¾, 2½, 3⅛, 4½"**
- **made in any stroke length**
- **over 150 skilled field engineers the world over to handle your fluid power requirements.**

## They all add up to:

## *LESS DESIGN TIME REQUIRED,*
## *LESS COST TO INSTALL AND MAINTAIN*

***Write for this Booklet***

Bulletin BM-25 gives full details on The Bellows Air Motor. No cost. Write Dept. FO-1258, The Bellows Co., Akron 9, Ohio.

## The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

1221-B-1



*Circle 579 on Page 51*

# Late News

**OUR ECONOMY:** This is the time of the year for predictions about business conditions in 1959. One of the first is a Dun & Bradstreet survey of 1548 businessmen. Of this group, 72 per cent believe that the first quarter of 1959 will be better than the same period in 1958. Among durable goods producers, the figure is 73 per cent. This feeling seems reasonable for industry as a whole, although the rate of recovery in the foundry industry apparently has lagged. Fortunately, there seems no place for casting tonnage to go but up. Unfilled orders turned up in the third quarter for the first time in more than a year.

**NFA ELECTS:** These officers were re-elected by the National Foundry Association at its annual meeting in Chicago, Nov. 20-21: President, Arthur G. Hall, Nordberg Mfg. Co., Milwaukee; vice president, R. C. S. Potter, Chemung Foundry Corp., Elmira, N. Y.; treasurer, W. G. Greenlee, Greenlee Foundry Co., Chicago. Charles T. Sheehan was reappointed executive secretary. R. J. Redmond, Buckeye Foundry Co., Cincinnati, was named an honorary member "for his contributions to the National Foundry Association and the gray iron industry."

**CARBON PRODUCTS ARE UP:** New prices announced by National Carbon Co., a division of Union Carbide Corp., New York, affect carbon and graphite electrodes, graphite anodes, and miscellaneous carbon and graphite products. Increases approximate 5 per cent and are reported to have been caused by the continued rise of raw material and labor costs.

**ICI OFFICERS:** Officers and directors of the Investment Casting Institute were elected at the group's annual meeting, held Nov. 13 in New York. New officers are R. R. Miller, president, Precision Metalsmiths Inc., president; John H. Morison, president, Hitchiner Mfg. Co., vice president; K. W. Thompson, president, K. W. Thompson Tool Co., treasurer. New directors (two-year term) are E. A. Democh, president, York Castings Inc., and Dr. Jack Keverian, manager, Applied Research & Development Laboratory, Foundry Dept., General Electric Co. Harry P. Dolan continues as executive director of the institute.

**NICKEL AVAILABLE:** The Office of Naval Material, Department of the Navy, has cancelled its instructions regarding the conservation of nickel through use of low-nickel, austenitic stainless steels AISI types 201 and 202. Nickel, nickel-base alloys, and nickel-bearing stainless steel may be specified and used whenever sound engineering practice indicates that such action is advantageous. Free World capacity in 1958 is nearly three times as great as the estimated consumption of 170 million lb.

**OBITUARY:** Dr. James T. MacKenzie, 67, former technical director, American Cast Iron Pipe Co., Birmingham, died suddenly Nov. 17. After his retirement from Acipco in 1956, Dr. MacKenzie was associated with Southern Research Institute and was active as a consultant. He was a past national director of AFS and an honorary life member of the Institute of British Foundrymen. In 1937 he received the J. H. Whiting Medal of AFS and in 1953 the Award of Merit of American Society for Testing Materials.

**A CHANGE AT SDCE:** The relatively young Society of Die Casting Engineers, Detroit, plans to appoint its first full-time official at a Dec. 10 meeting of the group's officers and directors. He will act in a promotional and development capacity and probably will take over the executive director and secretary's position, currently held by M. R. Tenenbaum, Lester-Phoenix Inc., as a part-time activity.

**PERSONALS:** Charles Ker has been named chairman of the board, Dalton Foundries Inc., Warsaw, Ind. Matt Dalton succeeds him as president . . . General Electric Co. has realigned three managerial positions in its Foundry Dept.: Edwin S. Lawrence becomes manager-manufacturing, Everett, Mass., found-

ries, and Charles J. Lauckner III takes over Mr. Lawrence's former position as manager-manufacturing engineering, Schenectady, N. Y., foundries. Martin J. O'Brien Jr., whom Mr. Lawrence replaces at Everett, assumes the new position of manager-steel foundry expansion, Schenectady foundries, where GE announced plans for a $3.7 million large steel casting foundry last March . . . Robert S. Hammond, vice president in charge of the Chicago office, Whiting Corp., Harvey, Ill., has retired . . . Chester A. Anderson has been appointed assistant general manager, Bay City Foundry Co., Bay City, Mich. . . . Leo I. Dana has been named vice president-technology and David Swan vice president-research, Linde Co., a division of Union Carbide Corp., New York . . . N. William Muller has been appointed a vice president of Great Lakes Carbon Corp., N. Y., and general manager of the firm's research and development department . . . John Hellstrom, vice president, American Air Filter Co., Louisville, has retired . . . William T. Ellison has joined Federal Foundry Supply Div., Archer-Daniels-Midland Co., Cleveland, as sales representative in western Illinois.

**MISCELLANY:** Jamestown Malleable Iron Corp., Jamestown, N. Y., will reopen its plant as soon as maintenance personnel can make necessary preparations. The plant has been closed since December, 1957 . . . Cast-O-Matic Corp. has opened a zinc and aluminum diecasting plant at Industrial Park, Syracuse, N. Y. President is J. J. Punke . . . St. Louis Steel Casting Inc., St. Louis, has acquired ownership of National Tank & Boiler Co., a St. Louis custom steel fabricator which operates two plants . . . Litemetal Diecast Inc., Jackson, Mich., has added a division to produce zinc diecastings. The company already makes magnesium and aluminum diecastings . . . Alabama Pipe Co., Anniston, Ala., is expected to produce cast iron soil and pressure pipe at Kokomo, Ind., at the former foundry of the Hoosier Iron Works Inc. . . . Dace Industries Ltd. has been formed in Windsor, Ont., to sell and manufacture air pollution control equipment. It is licensed to sell and manufacture Claude B. Schneible Co. products in Canada. President and general manager is R. Grant Whitehead, formerly secretary and sales manager for Schneible.

# Prices of Foundry Metals and Coke

(As of Nov. 20, 1958)

## FOUNDRY COKE

(Per net ton, f.o.b. ovens)

**BEEHIVE**

| | |
|---|---|
| Connellsville | $18.00-18.50 |

**OVEN**

| | |
|---|---|
| Birmingham | $28.85 |
| Buffalo | 30.50 |
| Detroit | 30.50 |
| Erie, Pa. | 30.50 |
| Indianapolis | 29.75 |
| Kearny, N. J. | 29.75 |
| Milwaukee | 30.50 |
| Montreal, Que. | 31.00 |
| Neville Island (Pittsburgh) | 29.25 |
| New England, deld. | 31.55 |
| Painesville, O. | 30.50 |
| Philadelphia | 29.50 |
| St. Louis | 31.50 |
| St. Paul | 29.75 |
| Swedeland, Pa. | 29.50 |
| Terre Haute, Ind. | 29.75 |

## PIG IRON

(Per Gross ton f.o.b. furnace)

| | No. 2 Foundry | Malleable |
|---|---|---|
| Birdsboro, Pa. | $68.50 | $69.00 |
| Birmingham | 62.50 | 66.50 |
| Buffalo | 66.50 | 67.00 |
| Chester, Pa. | 68.50 | 69.00 |
| Chicago | 66.50 | 66.50 |
| Cleveland | 66.50 | 66.50 |
| Duluth | 66.50 | 66.50 |
| Erie, Pa. | 66.50 | 66.50 |
| Everett, Mass. | 68.00 | 68.50 |
| Fontana, Calif. | 75.50 | .... |
| Geneva, Utah | 66.50 | .... |
| Granite City, Ill. | 68.40 | 68.90 |
| Neville Island (Pittsburgh) | 66.50 | 66.50 |
| Swedeland, Pa. | 68.50 | 69.00 |
| Toledo, O. | 66.50 | 66.50 |
| Troy, N. Y. | 68.50 | 69.00 |
| Youngstown, O. | .... | 66.50 |

## NONFERROUS INGOT

(Cents per pound, carlots)

**BRASS AND BRONZE:** Red brass, No. 115, 29.00; tin bronze, No. 225, 38.00; No. 245, 32.75; High-leaded tin bronze, No. 305, 33.25; No. 1 yellow, No. 405, 24.00; manganese bronze, No. 421, 25.75.

**ALUMINUM:** 99 per cent plus primary ingots 26.80. Secondary No. 12 alloy, 21.50-22.00. Deoxidizing grades: No. 1, 22.75; No. 4, 18.00.

**MAGNESIUM:** 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

**COPPER:** Electrolytic 29.00, delivered Connecticut valley.

**ZINC:** High grade 12.50, delivered. Die casting alloy No. 3, 14.00; No. 2, 14.25, delivered.

## IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

| | No. 1 Heavy Melting Steel | No. 1 Cupola Cast | Heavy Breakable Cast | Clean Auto Cast | Machinery Cast | Malleable | Short Steel Rails |
|---|---|---|---|---|---|---|---|
| Birmingham | $36.00-37.00 | $54.00-55.00 | ..... | ..... | ..... | ..... | $52.00-53.00 |
| Boston* | **29.00-30.00 | **33.00-34.00 | ..... | ..... | **36.00-38.00 | ..... | ..... |
| Buffalo | 35.00-36.00 | **44.00-45.00 | ..... | ..... | **48.00-49.00 | ..... | 54.00-55.00 |
| Chicago | 43.00-45.00 | 45.00-46.00 | ..... | 51.00-52.00 | 51.00-52.00 | 55.00-56.00 | 58.00-60.00 |
| Cincinnati* | **38.50-39.50 | **45.00-46.00 | **38.00-39.00 | ..... | **47.00-48.00 | ..... | **55.00-56.00 |
| Cleveland | 39.50-40.50 | 44.00-45.00 | 36.00-37.00 | 49.00-50.00 | 49.00-50.00 | 63.00-64.00 | 57.00-59.00 |
| Detroit* | **35.00-36.00 | 46.00-47.00 | 37.00-38.00 | 48.00-49.00 | ..... | ..... | ..... |
| Los Angeles | 34.00 | **46.00 | ..... | ..... | ..... | ..... | ..... |
| New York* | 28.00-29.00 | 36.00-37.00 | 33.00-34.00 | ..... | ..... | ..... | ..... |
| Philadelphia | 37.00 | 41.00 | 42.00-43.00 | ..... | 49.00-50.00 | 58.00 | ..... |
| Pittsburgh | 42.00-43.00 | 44.00-45.00 | ..... | 39.00-40.00 | 51.00-52.00 | ..... | 57.00-59.00 |
| St. Louis* | 38.00 | 49.00 | 38.00 | 49.00 | ..... | ..... | 52.00 |
| San Francisco | 32.00 | 44.00 | 28.00 | 40.00 | 40.00 | ..... | ..... |
| Seattle | 30.00 | 31.00 | 28.00 | ..... | ..... | ..... | ..... |

*Brokers' buying prices. **F.o.b. shipping point.

# For Cleaner Surfaces, Better Shakeout, Try WHITEHEAD'S NEW HYGEIA LYQUAFLOUR

**Our new plant at Irwin, Pa., is producing the improved DUSTLESS DOUBLE STRENGTH HYGEIA LYQUAFLOUR. The compound of a special hydrocarbon and woodflour improves castings and mold conditions for all types of metal. Highly recommended for the advantages listed below:**

- One sand additive controls both peel and expansion
- Good shakeout saves sand
- Imparts highest flowability to sand mixture to give pattern true finish
- 2% initial treatment of sand and as little as ¼ of 1% to reactivate does the job
- Replaces any carbon or hydrocarbon materials now used
- Eliminates dust at the muller
- Castings peel excellently which reduces cleaning room time
- Reduces penetration and burn-on
- Overcomes sand expansion defects, maintains good compression strength
- Improves molding, "feel", and "moldability"
- No rigid control required
- Permits hard ramming
- Less ramming required, more molds per hour
- Less temper water needed

## Whitehead Brothers COMPANY

Established 1841

**NEW YORK OFFICE**
324 West 23rd St., New York 11, N. Y.

**NEW ENGLAND OFFICE**
75 Westminster St., Providence 1, R. I.

***Manufacturers of***

**LYQUAGRIP**
Ready-to-use core paste

**DUO RESIN**
Binder for baking with controlled oven temperatures

**JOINT SEAL**
Plastic compound for perfect sealing

**LYQUAFACE**
The liquid sand grain coating

**DOB-IT**
Ready-to-use core mudding compound


*Circle 580 on Page 51*

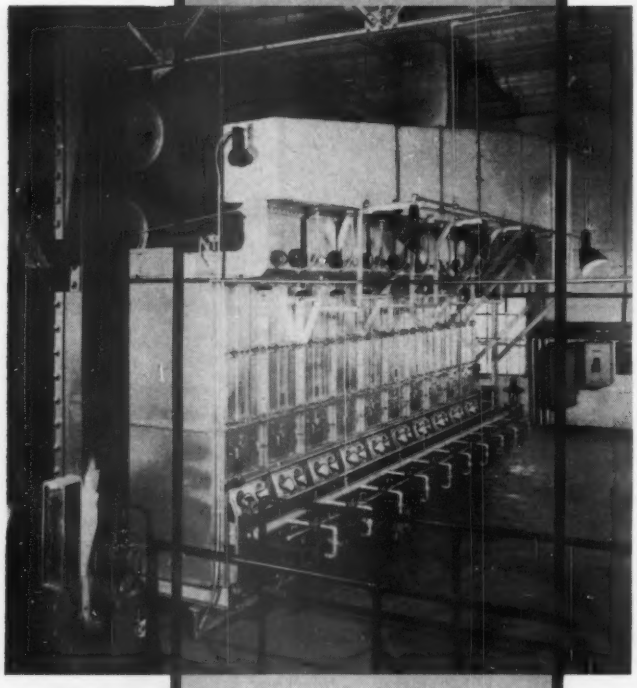
# ROSS

Air Systems

*Engineered Atmospheres for Better Processing*

# ROSS HOT BLAST SYSTEM

- *an efficient way to heat cupola air*
- *a simple way to get this hot air to the cupola*



How hot would you want the air going to the cupola? 500 degrees? 1000 degrees?

The ROSS Hot Blast System can deliver hot air in any volume required up to about 1000°F. It is designed with two major variations: (1) for heating the air up to 500°F. and (2) up to 1000°F. Either unit can be tied into your present operations without stopping production. Existing blowers, if correctly rated, can be used.

You know the production advantages in being able to deliver to the cupola air preheated to the correct temperature — and held at that temperature — in the required volume. We suggest you ask to have a Ross Engineer study your cupola layout and outline probable savings if you change over to the Ross System.

## ROSS CORE OVENS

While the Hot Blast System makes use of air and there is definitely a conditioning and control problem involved, it is with the CORE OVEN that skill in designing and creating the 'engineered atmosphere' is the major factor. For, Curing Ovens, to be most efficient, must coordinate temperature, air volume and air movement so as not only to provide uniform temperature conditions throughout the oven but to keep temperature drop to a minimum. Only uniformly baked cores can assure maximum production of castings. Wide temperature variations are bad.

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

J. O. Ross Engineering, New York
John Waldron Corporation, New Brunswick, N. J.
Andrews and Goodrich, Boston
Ross Engineering of Canada Limited, Montreal
Ross Midwest Fulton, Dayton
Hartig Extruders, Mountainside, N. J.
Carrier-Ross Engineering Company, Ltd., England

MFR

**J. O. ROSS ENGINEERING**
Division of Midland-Ross Corporation

*444 Madison Avenue, New York 22, N. Y.*
ATLANTA • BOSTON • CHICAGO
DETROIT • LOS ANGELES • SEATTLE

# Super V-belts on tough drive save $1000

***Especially designed*** to withstand heat, oil and the heaviest shock loads, Gates Super Vulco Ropes solve tough drive problems and reduce both maintenance and replacement costs.

For instance: Hackney Iron and Steel Company, Enid, Oklahoma, formerly used a flat leather belt to drive the hydraulic pump on its huge forming press. This belt—only 18 inches from the red hot steel being shaped—would stretch, slip and come off the drive.

When a new press was installed, a compact, dependable Gates Super Vulco Rope was substituted. This drive—operating 8 hours a day for 5 years *without lost time for maintenance*—has saved the company more than $1000.

Claude King, maintenance superintendent, says, "Because of the way Gates Super Vulco Ropes have stood up on four of our presses, I plan to convert other drives in the plant to Super Vulco Ropes."

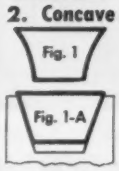
Drive data and design assistance are quickly available to you. Simply call your nearby Gates Distributor. Gates V-Belt stocks are carried in all major industrial centers.

## No other V-belt has ALL these advantages

**1. Flex-Weave Cover** (U. S. Pat. 2519590)

A Gates exclusive: provides greater flexibility...prolongs belt life...helps deliver more power to driven machine.

**2. Concave Sidewalls** (U. S. Pat. 1813698)




Note the concave sides shown in Fig. 1. As belt bends, concave sides become straight, making uniform contact with sheave groove (Fig. 1-A). Even contact means uniform wear...far longer belt life.

**3. Tough, Resilient Tensile Cords**

Super strong and resilient; provide 40% greater horsepower capacity...easily absorb heavy shock loads...reduce number of belts required, save weight and space.

**4. High Electrical Conductivity**

Built into Gates Super Vulco Ropes for safer drives (in explosive atmosphere).

**5. Oil, Heat, Weather Resistant**

Made with special rubber compounds, Super Vulco Ropes stand up longer under all conditions.

TPA 352

Gates

World's Largest Maker of V-Belts

**THE GATES RUBBER COMPANY**

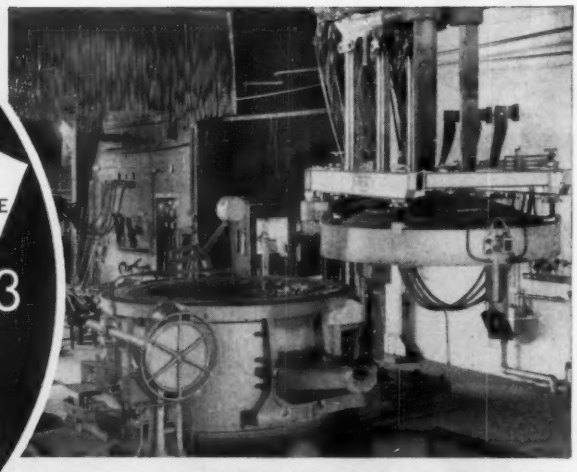
Denver, Colorado

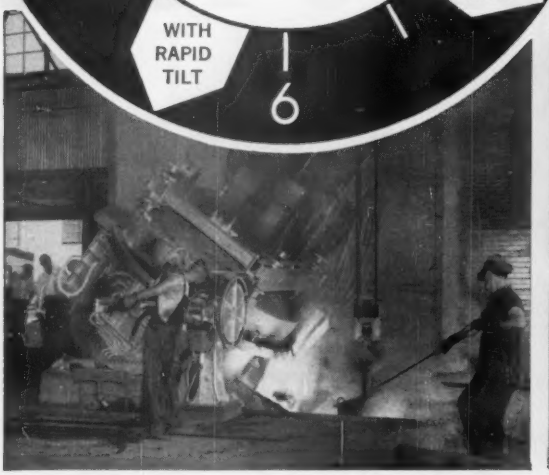
# Gates Super VULCO ROPE Drives

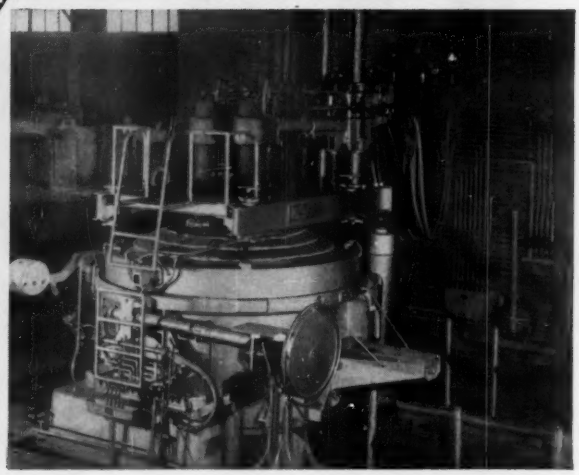
**40% more Horsepower Capacity**



Circle 582 on Page 51







# When you melt... LECTROMELT*

**TOP CHARGING** provides smooth, fast turn-around in furnace operation—less downtime between heats and less heat loss. Linings and electrodes last longer.

**HIGH POWER INPUT** allows rapid metal melting. Lectromelt makes this possible with large transformers and leads, more efficient cooling and heavier furnace construction.

**RAPID TILTING** is accomplished smoothly and safely. Mechanism is accurate, strong and side-mounted—located out from under, where it won't get clogged by spillage.

Catalog 10 describes Lectromelt Furnaces. For a copy, write Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

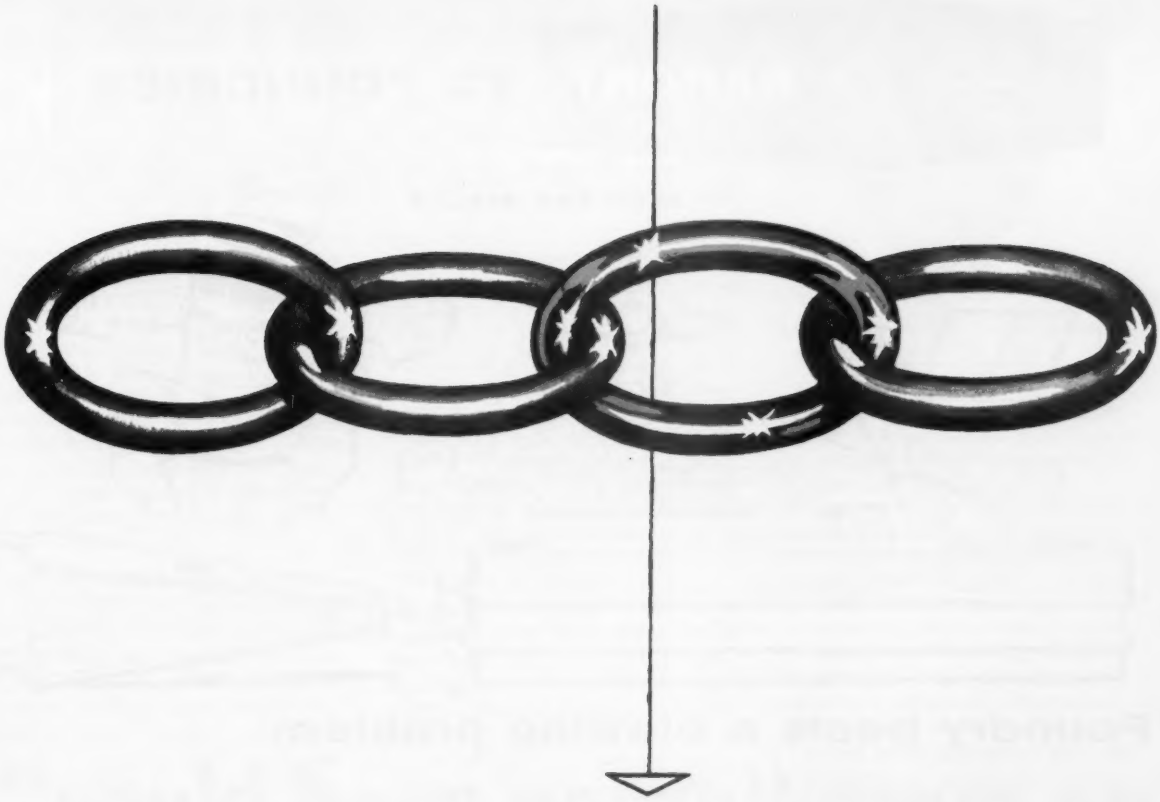
*Reg. Trademark U.S. Pat. Off.

McGRAW EDISON

# Lectromelt

STANDARD SIZES UP TO TWO HUNDRED TONS CAPACITY

CANADA: Canefco Limited, Toronto . . . ARGENTINA: Master Argentina, Buenos Aires . . . ITALY: Forni Stein, Genova . . . ENGLAND: Electric Furnace Co., Ltd., Weybridge . . . GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg . . . SPAIN: General Electrica Espanola, Bilbao . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege . . . JAPAN: Daido Steel Company, Ltd., Nagoya



**SILICON — A VITAL LINK** — indispensable in iron and steel, essential in aluminum casting alloys.

There are, today, many ferrosilicon alloys available, offering maximum efficiency and economy for industry's varied requirements. We have developed silicon alloys for specific applications, and extended the use of existing alloys. Our patented mold cast process provides silicon alloys of highest density, uniformity, and cleanliness.

A major producer of ferrosilicon for over thirty years, our four plants and strategically located warehouses assure you prompt delivery by water, rail, or truck.

Qualified technical personnel are ready to assist you in selecting the most efficient and economic silicon alloy for your needs.

*Ohio Ferro-Alloys Corporation*
*Canton, Ohio*

**SALES OFFICES**

**Birmingham • Chicago • Detroit • Los Angeles • Philadelphia • Pittsburgh • San Francisco • Seattle • Denver • Minneapolis • Kansas City**

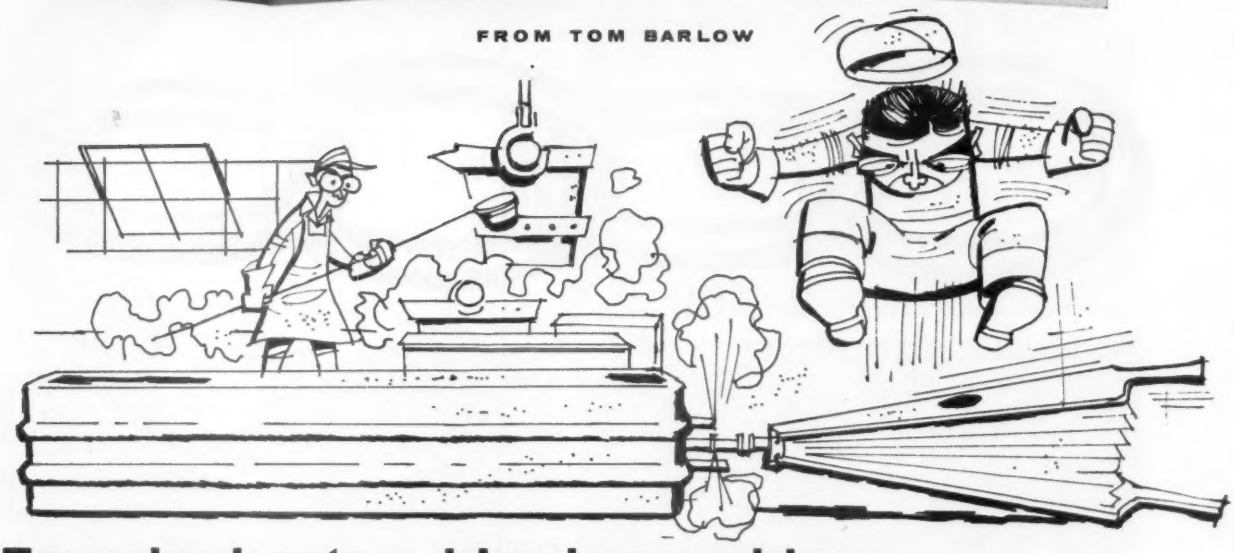


*Circle 584 on Page 51*

International Minerals & Chemicals

A REPORT TO FOUNDRIES

FROM TOM BARLOW



## Foundry beats a blowing problem:

# no more "green sand blues"

Blowing of green sand certainly isn't a common foundry occurrence. But where it's encountered, it can cause real headaches. For that reason, we're proud of the record of our service people who are able to demonstrate "overnight" the ability of Plasti-Bond to impart "blowability" in green sand for this special and very difficult task.

Here's a recent example. One of our customers had a ticklish blowing operation — difficult because it involved filling a cavity over six feet long and with only a two-inch opening. To complicate matters even more, blowing had to be accomplished from one end.

First they tried to reduce the green strength, but no go — hardness wasn't sufficient to withstand metal penetration at the end farthest from the blow holes. Just one answer: Change the sand.

**Plasti-Bond came through, all right . . . in a sand having a green strength of 10 to 11 pounds, a moisture of 4.5 to 5. And while these details may concern only foundries faced with that particular problem, there's a moral to the story for all foundrymen. It's the fact that this special additive, Plasti-Bond, can make sand do tricks that can't be brought off any other way. Perhaps you have an unusual sand problem with which we might demonstrate the same success.**

## *Rules out ram-offs!*

Many a foundryman goes wrong in his thinking on sands by assuming that they transmit a squeeze pressure in all directions, like fluids. Tain't so. Actually, sand transmits most of its pressure in a direct line, with very little of that energy moving sideways.

Sure, this feature is improved greatly by additives such as Triplact and Plasti-Bond. But it's still true that mold pressure from the squeeze or packing from the jolt is essentially in a *vertical* direction, and not necessarily toward the pattern. (This varies, of course, with sand flowability.) As a result, any pre-packing or shift of force after the preliminary jolt or squeeze will create a ram-off condition. This is described by the AFS as "a casting defect resulting from a section of the mold being forced away from the pattern by ramming sand after it is formed to the pattern contour."

**Because of the design and patented features of the Taccone Diaphragm Machine, the molding is always toward the pattern — never past it or away from it. For this reason, ram-offs are impossible.**

If you'd like a complete description of this and the many other features of the Taccone machine, drop us a card. We'll send the full story on high-pressure molding.

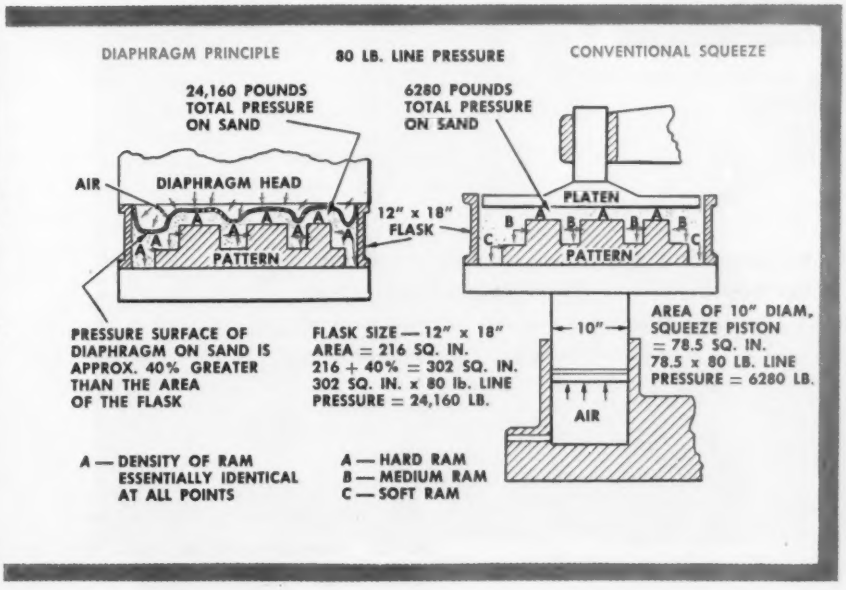
## Ten year old granddaddy

Over 10 years ago, a new Eastern Clay product called Westonite made quite an impact on this industry. It gave the foundryman finish, flowability and casting appearance that promised to revolutionize the entire method of molding. There are still several foundries using this carbon-bonded sand because it's especially suited to their operation. But since little is heard about it lately, we get questions which add up to "Wha hoppen?"

**In principle, Westonite continues to grow. Or — to use a homely simile — Westonite lives on through its children and grandchildren. Newer additives are actually outgrowths of this original chemically bonded sand. Today they are widely used to provide peel or cleaning action . . . to give flowable, fast molding, easy shakeout and controlled moisture sands. Matter of fact, in looking over literature on Westonite's advantages, we find a complete description of the advantages of Triplact, Plasti-Bond and Z-Flo.**

Since originating this concept of molding, Eastern Clay has never let up in research and development work. In the future, we will no doubt come out with new and superior products that will push the basic benefits of these additives even further. Every application brings a more complete knowledge of what makes these things tick.

**If you're interested in the technical aspects of Plasti-Bond, we'd like to send you a copy of a Foundry Magazine reprint, "Recent Developments in High Pressure Molding" by Tom Barlow. If you're concerned only with making better castings at lower cost without delving into the "whys" or "hows," we'd like the chance to make a demonstration in your own plant.**


DIAPHRAGM PRINCIPLE
80 LB. LINE PRESSURE
CONVENTIONAL SQUEEZE
24,160 POUNDS TOTAL PRESSURE ON SAND
6280 POUNDS TOTAL PRESSURE ON SAND
AIR
DIAPHRAGM HEAD
12" x 18" FLASK
PLATEN
PATTERN
PATTERN
PRESSURE SURFACE OF DIAPHRAGM ON SAND IS APPROX. 40% GREATER THAN THE AREA OF THE FLASK
FLASK SIZE — 12" x 18"
AREA = 216 SQ. IN.
216 + 40% = 302 SQ. IN.
302 SQ. IN. x 80 lb. LINE PRESSURE = 24,160 LB.
10"
AREA OF 10" DIAM. SQUEEZE PISTON = 78.5 SQ. IN.
78.5 x 80 LB. LINE PRESSURE = 6280 LB.
AIR
A — DENSITY OF RAM ESSENTIALLY IDENTICAL AT ALL POINTS
A — HARD RAM
B — MEDIUM RAM
C — SOFT RAM

## A coupla cupola cues

If you look upon patching of the cupola as a necessary evil, you've got company. Most foundrymen do. But good patching is no accident — it's based on modern, scientific knowledge. In fact, it's an important function in the control of metallurgical properties and the chemistry of the castings you sell.

**Remember, the quality of patching material may affect the melting rate. It influences temperature, uniformity and cleanliness of molten metal while controlling the rate of silicon and manganese losses and phosphorous pick-up.**

Moreover, good patching is always cheapest, because the quality of the material controls bridging, erratic analysis and many other cupola ills. Besides, you can have top quality patching materials at only a shade over the initial cost of the cheapest local "muds." The longer life gained is well worth it.

**But cost is secondary. Without a doubt, the most important value of good mixes is good metallurgical control. At the same time, it's the most frequently overlooked virtue.**

We'd be glad to show you how our Cupoline patching mix might add an "extra" to the quality of your castings. This fireclay is highly plastic and has great hot strength. It's a selected weathered clay that slakes fast and accepts water readily.

CREATORS OF LIVING MINERALS

EASTERN CLAY PRODUCTS DEPT.

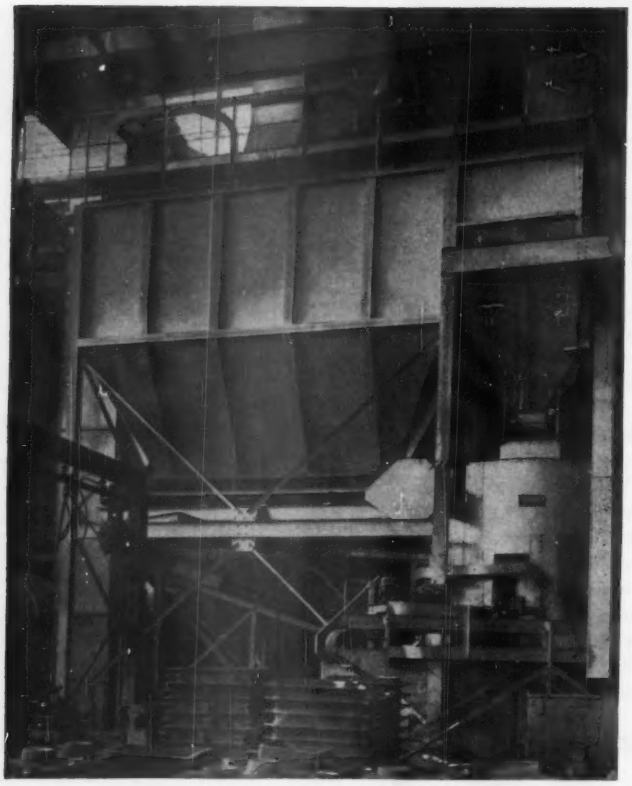
**INTERNATIONAL MINERALS & CHEMICAL CORPORATION**

Administrative Center, Old Orchard Road, Skokie, Illinois • ORchard 6-3000



Circle 585 on Page 51

# *high quality castings need high quality foundry sand . . .*



A Clearfield 930 Mixer is the heart of the sand conditioning system in a gray iron foundry.

**and**
**<u>that</u>**
**calls for a**

*Clearfield Mixer*

A Clearfield Mixer will consistently give you the quantity of sand when you need it, where you need it and with the desired qualities for your particular application. Clearfield Mixers are available in many sizes, to meet every requirement . . . as single units or as part of a sand processing system.

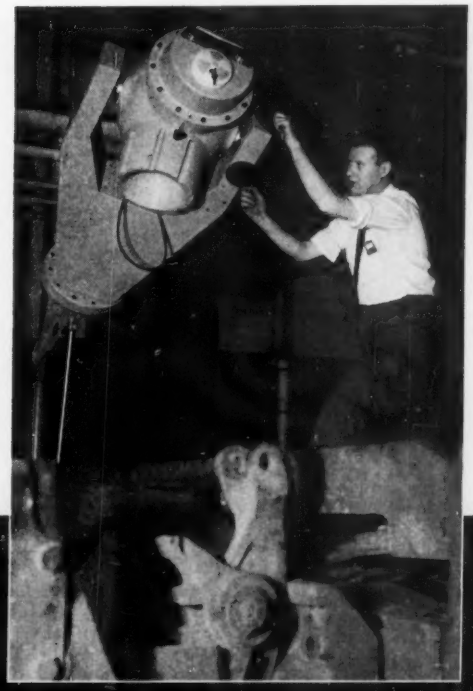
**CLEARFIELD MIXER**
**the choice of industrial leaders**

Write today for Catalog No. 83. Get the full information on the tested efficiency of all Clearfield Mixers.

## CLEARFIELD MACHINE COMPANY

**Clearfield, Pennsylvania, U. S. A.**

# big power for big jobs



**Cyclops Cobalt$^{60}$ unit**

**puts 2-3,000,000 volt equivalent**

**x-ray on wheels**

- ✓ radiographs up to 12" thick steel
- ✓ costs under $20,000
- ✓ works anywhere

GET THE FACTS – call any Picker District office (see local 'phone book) or write, telephone or wire Picker X-Ray Corporation, 25 South Broadway, White Plains, N. Y.

**one stop for everything in industrial radiography**

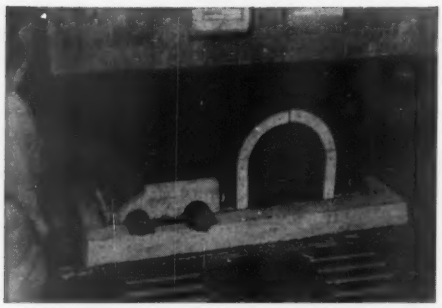
| | |
|---|---|
| ANDREX | portable x-ray units—130 KV, 160 KV, 200 KV, 260 KV |
| PICKER | x-ray units—5 to 50 KV, 150 KV (stationary and mobile), 270 KV portable, 260 KV heavy-duty |
| TECH/OPS | units for isotope radiography—sources, equipment, containers for Iridium $^{192}$ Cobalt $^{60}$ and Thulium $^{170}$ |
| ACCESSORIES | . . . films, tanks, darkroom sundries, illuminators, *everything* |

Picker x-ray



*Circle 587 on Page 51*

After only 90 seconds of vibrating, 2500 pounds of core "come clean".



# CP Core Box Vibrator frees 3000 pound cores in 90 seconds!

In just a minute-and-a-half this Core Box Vibrator frees cores weighing up to a ton-and-a-half! Core output is greatly increased and you get a perfect draw every time. Cores come out with no flaws, damaged edges, distorted sections or dimensional variations . . . there's no time wasted troweling. Needs no special adaptors . . . the built-in air clamp holds the vibrator securely to any core box cleat up to 6¼" wide. Its 9000 orbital vibrations per minute eliminate sledging . . . reduce core box maintenance to a minimum. In spite of the core size, the CP vibrator is positioned only once. Write for free demonstration on your work.

*Chicago Pneumatic Tool Company,*
*8 East 44th St., New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# THE NET RESULT

## OF USING

Smith L-O Core Oil

### SOUND, ACCURATE CORES AT LOWEST POSSIBLE COST

With Smith L-O on the job, cores are bound for strength, durability and uniformity . . . thin and thick sections dry rapidly and evenly . . . quick collapsibility makes the shake-out a cleaner operation. Smith L-O core oil's uniform high quality plus the invaluable assistance of the Smith Practical Foundry Serviceman in your area is your assurance of increased productivity and profits. Look first to Smith L-O . . . the name that stands for a service as well as a product.

### SMITH REPRESENTATIVES

- ALGONQUIN CHEMICAL CO., INC. Hamburg, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- ATLAS FOUNDRY SUPPLY CO. Santa Ana, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- BRUCE-CONREAUX CO. INC. Indianapolis 7, Indiana
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- MALCOLM G. STEVENS Arlington, Massachusetts
- OVERSEAS COMMODITIES, LTD. Vancouver, B.C., Canada

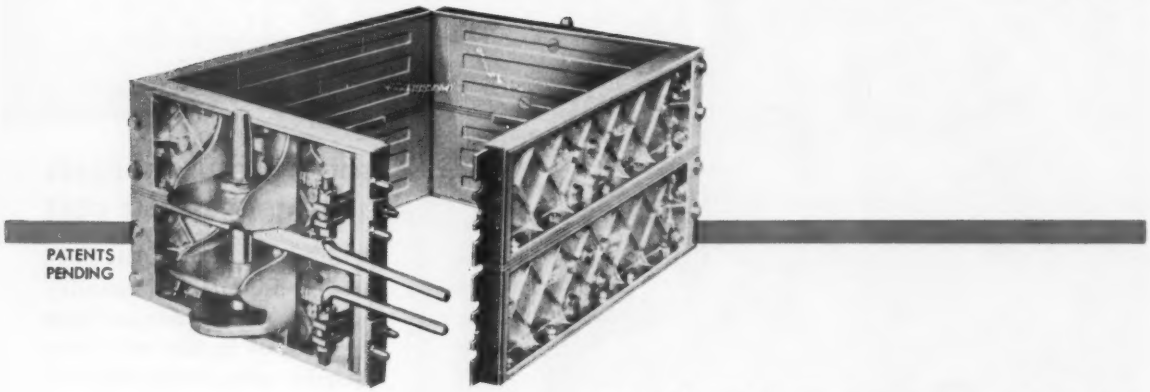


Circle 589 on Page 51

# HINES straight-wall "HINGE-OFF" FLASKS

*One of many* **HINES** *developments contributing to better foundry production*

*Lightweight metal flasks, recommended for hand and mechanical molding of loose match plate and cope and drag plate patterns, up to 20" in length.*



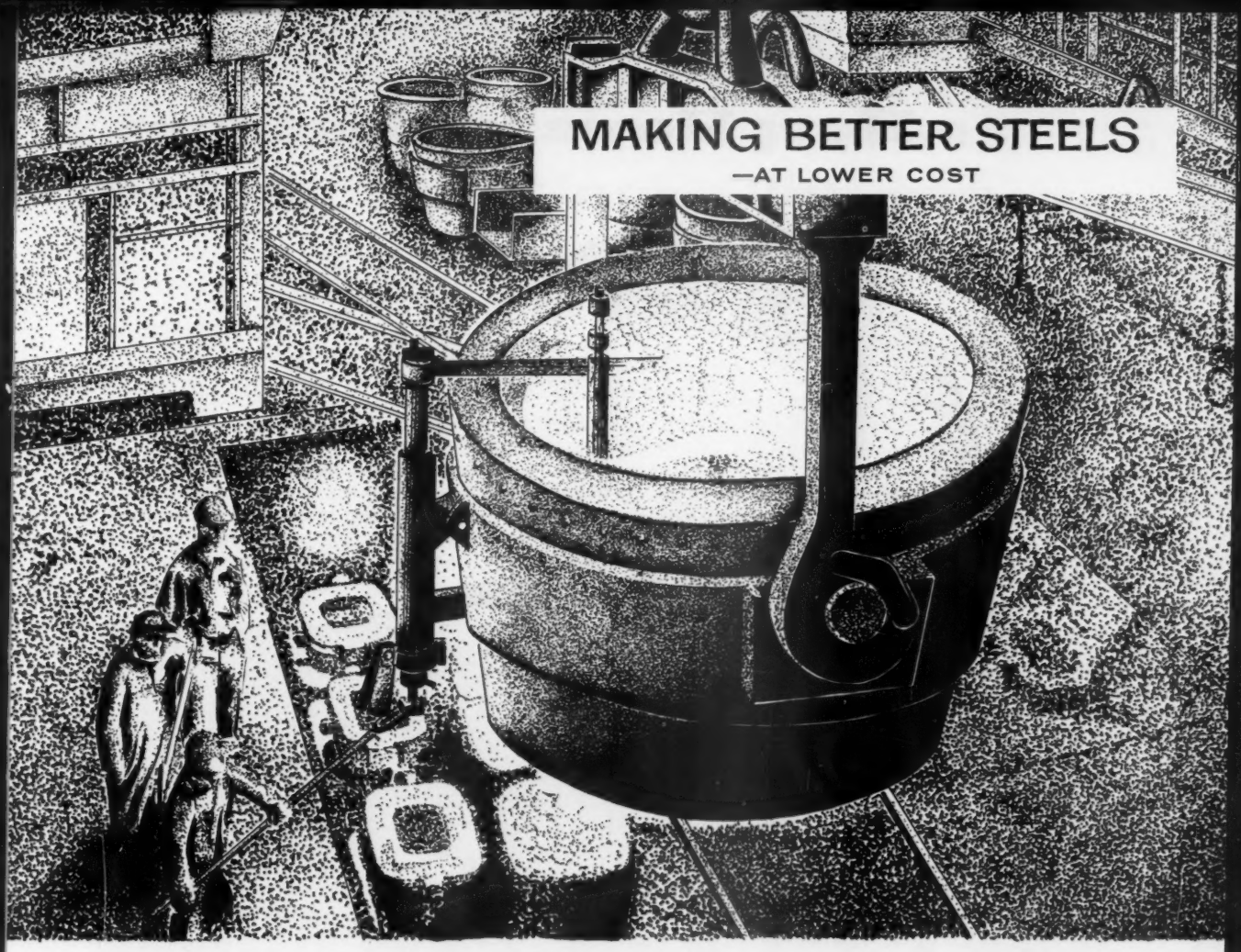
PATENTS PENDING

- Made of metal, the "HINGE-OFF" maintains alignment — will not warp from absorbing moisture.
- Positive, fast-acting locking mechanism aligns and locks the open end rigidly, to prevent shift.
- Only one adjustment — tightening the nuts on the locking mechanism. Low maintenance cost — flasks can be repaired and aligned in your own plant.
- No wood screws to work loose!
- Accurate pins and guides, and pin center alignment.
- Lengths and widths, 10" to 20". Depths from 6" to 11". Standard HINES pins, bushings or guides. Upsets and bands can be supplied.

***WRITE FOR CATALOG FOLDER NO. 203***

**THE HINES FLASK CO.**
**3431 WEST 140th STREET • CLEVELAND 11, OHIO**

**HINES FLASKS**




# TEEMING

. . . top quality steel from ladle to ingot climaxes another job well done by melters who know every trick of their trade.

Experienced melters have also discovered that **GLC GRAPHITE ELECTRODES** with **"weld-strength" Unitrode®** nipples help make better steels at lower cost.

**FREE**—*This illustration of one of the skills employed by the men who make the metals has been handsomely reproduced with no advertising text. We will be pleased to send you one of these reproductions with our compliments. Simply write to Dept. F-12.*

ELECTRODE GLC® DIVISION

**GREAT LAKES CARBON CORPORATION**

18 EAST 48TH STREET, NEW YORK 17, N.Y. OFFICES IN PRINCIPAL CITIES

*Circle 591 on Page 51*

# How Howard Beacham licked

Howard Beacham has been a Bay State Abrasive Engineer for fifteen years and his total experience is double that. He's worked on grinding problems that have involved every type of metal in jobs as tiny as miniature bearings and as big as the world's largest air compressors and steam turbines.

# a king-size cut-off problem at Black-Clawson . . .

It's one thing to cut half-inch gates and risers off small castings but, when you have to cut through a solid foot of high strength cast iron, the problems of heat and wheel-wear are no joke.

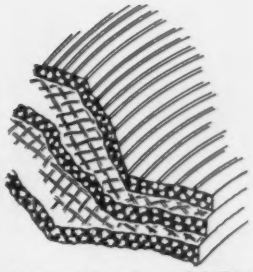
At The Black-Clawson Co., Inc., Watertown, N. Y., one of the World's biggest manufacturers of paper-making machinery, they regularly have to trim up castings as heavy as 3500 lbs. with risers as thick as 12" in diameter. So when Bay State research produced the now famous BZ2AA reinforced cut-off wheel, Bay State Abrasive specialist Howard Beacham saw to it that several samples were tried at Black-Clawson.

Results? Well, as Foundry Superintendent Ted Frazell says: "It isn't exactly the same as a knife through butter, but it's the fastest cut-off wheel *we've* ever seen."

"Safety is important too," adds Cleaning Room Foreman C. W. Shay. "A man doesn't do his best work when he's gun-shy the way you get with a wheel that shatters on you if it gets twisted a little. But the boys in my department have real confidence in this BZ2AA. They *know* it's safe."

Like Howard Beacham, your local Bay State factory representative or distributor is a trained abrasive specialist . . . a problem-solver who can often save you time, trouble and money. *Better grinding at lower cost . . . that is his business.*

(*Left*) Operator Leo Busler regularly takes slightly over two minutes to cut a 12" riser off a 3500 lb. dryer head casting. He uses a Bay State 24x5/16x1-3/4 BZ2AA abrasive cut-off wheel.



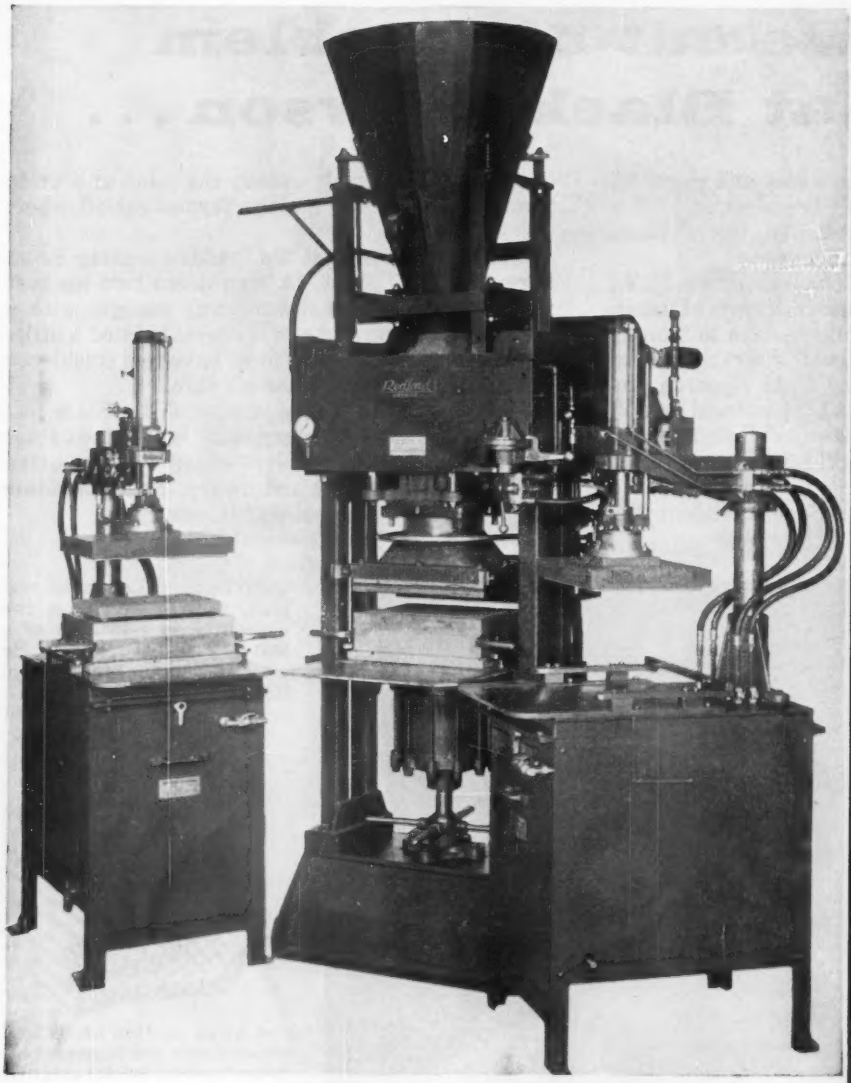
Cut-away section of BZ2AA wheel shows reinforcement between layers of bonded abrasive. Improved Bay State bond formulation and bonding technique result in accurate control and close matching of wear rates of all three major components of wheel . . . bond, reinforcement and abrasive.

# BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
*In Canada:* Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
*Branch Offices:* Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.


Circle 592 on Page 51



# REDFORD $CO_2$ MOLD MAKING EQUIPMENT

Here is a proven way of applying the $CO_2$ process to the production of small castings. With the above Redford #420-D Core Blower and (2) Model H-2-M Gassing Stations, one mold is being blown and squeezed while another one is automatically gassed and stripped. Up to 80 complete molds (cope and drag) are produced in one hour. Molds are flat and can be stacked for pouring. Metal yield is greatly increased. Very little floor space is required. Millions of small parts have been cast to close tolerances at reduced costs. For complete information write for BULLETIN No. 421.


Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

**TYPICAL $CO_2$ MOLD CASTINGS**

**½ Actual Size**

# Reader Information Service

FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 165 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

## FURTHER INFORMATION on Advertised Products ?

December 1958

SIMPLY CIRCLE AD ITEM NUMBER BELOW

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 551 | 566 | 581 | 596 | 611 | 626 | 641 | 656 |
| 552 | 567 | 582 | 597 | 612 | 627 | 642 | 657 |
| 553 | 568 | 583 | 598 | 613 | 628 | 643 | 658 |
| 554 | 569 | 584 | 599 | 614 | 629 | 644 | 659 |
| 555 | 570 | 585 | 600 | 615 | 630 | 645 | 660 |
| 556 | 571 | 586 | 601 | 616 | 631 | 646 | 661 |
| 557 | 572 | 587 | 602 | 617 | 632 | 647 | 662 |
| 558 | 573 | 588 | 603 | 618 | 633 | 648 | 663 |
| 559 | 574 | 589 | 604 | 619 | 634 | 649 | 664 |
| 560 | 575 | 590 | 605 | 620 | 635 | 650 | 665 |
| 561 | 576 | 591 | 606 | 621 | 636 | 651 | 666 |
| 562 | 577 | 592 | 607 | 622 | 637 | 652 | 667 |
| 563 | 578 | 593 | 608 | 623 | 638 | 653 | 668 |
| 564 | 579 | 594 | 609 | 624 | 639 | 654 | 669 |
| 565 | 580 | 595 | 610 | 625 | 640 | 655 | 670 |
| 671 | 686 | 701 | 716 | 731 | 746 | 761 | 776 |
| 672 | 687 | 702 | 717 | 732 | 747 | 762 | 777 |
| 673 | 688 | 703 | 718 | 733 | 748 | 763 | 778 |
| 674 | 689 | 704 | 719 | 734 | 749 | 764 | 779 |
| 675 | 690 | 705 | 720 | 735 | 750 | 765 | 780 |
| 676 | 691 | 706 | 721 | 736 | 751 | 766 | 781 |
| 677 | 692 | 707 | 722 | 737 | 752 | 767 | 782 |
| 678 | 693 | 708 | 723 | 738 | 753 | 768 | 783 |
| 679 | 694 | 709 | 724 | 739 | 754 | 769 | 784 |
| 680 | 695 | 710 | 725 | 740 | 755 | 770 | 785 |
| 681 | 696 | 711 | 726 | 741 | 756 | 771 | 786 |
| 682 | 697 | 712 | 727 | 742 | 757 | 772 | 787 |
| 683 | 698 | 713 | 728 | 743 | 758 | 773 | 788 |
| 684 | 699 | 714 | 729 | 744 | 759 | 774 | 789 |
| 685 | 700 | 715 | 730 | 745 | 760 | 775 | 790 |
| 791 | 806 | 821 | 836 | 851 | 866 | 881 | 896 |
| 792 | 807 | 822 | 837 | 852 | 867 | 882 | 897 |
| 793 | 808 | 823 | 838 | 853 | 868 | 883 | 898 |
| 794 | 809 | 824 | 839 | 854 | 869 | 884 | 899 |
| 795 | 810 | 825 | 840 | 855 | 870 | 885 | 900 |
| 796 | 811 | 826 | 841 | 856 | 871 | 886 | 901 |
| 797 | 812 | 827 | 842 | 857 | 872 | 887 | 902 |
| 798 | 813 | 828 | 843 | 858 | 873 | 888 | 903 |
| 799 | 814 | 829 | 844 | 859 | 874 | 889 | 904 |
| 800 | 815 | 830 | 845 | 860 | 875 | 890 | 905 |
| 801 | 816 | 831 | 846 | 861 | 876 | 891 | 906 |
| 802 | 817 | 832 | 847 | 862 | 877 | 892 | 907 |
| 803 | 818 | 833 | 848 | 863 | 878 | 893 | 908 |
| 804 | 819 | 834 | 849 | 864 | 879 | 894 | 909 |
| 805 | 820 | 835 | 850 | 865 | 880 | 895 | 910 |

## EXTRA COPIES OF ARTICLES ?

FILL IN PAGE NUMBER AND TITLE OF ARTICLES DESIRED

| Page No. | Title of Article |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

This card good in U. S. and Canada only—Expires Feb. 15, 1959

NAME .....

POSITION .....

FIRM .....

STREET .....

CITY ..... ZONE.....

STATE .....

PRODUCT MANUFACTURED .....


## FURTHER INFORMATION on Advertised Products ?

December 1958

SIMPLY CIRCLE AD ITEM NUMBER BELOW

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 551 | 566 | 581 | 596 | 611 | 626 | 641 | 656 |
| 552 | 567 | 582 | 597 | 612 | 627 | 642 | 657 |
| 553 | 568 | 583 | 598 | 613 | 628 | 643 | 658 |
| 554 | 569 | 584 | 599 | 614 | 629 | 644 | 659 |
| 555 | 570 | 585 | 600 | 615 | 630 | 645 | 660 |
| 556 | 571 | 586 | 601 | 616 | 631 | 646 | 661 |
| 557 | 572 | 587 | 602 | 617 | 632 | 647 | 662 |
| 558 | 573 | 588 | 603 | 618 | 633 | 648 | 663 |
| 559 | 574 | 589 | 604 | 619 | 634 | 649 | 664 |
| 560 | 575 | 590 | 605 | 620 | 635 | 650 | 665 |
| 561 | 576 | 591 | 606 | 621 | 636 | 651 | 666 |
| 562 | 577 | 592 | 607 | 622 | 637 | 652 | 667 |
| 563 | 578 | 593 | 608 | 623 | 638 | 653 | 668 |
| 564 | 579 | 594 | 609 | 624 | 639 | 654 | 669 |
| 565 | 580 | 595 | 610 | 625 | 640 | 655 | 670 |
| 671 | 686 | 701 | 716 | 731 | 746 | 761 | 776 |
| 672 | 687 | 702 | 717 | 732 | 747 | 762 | 777 |
| 673 | 688 | 703 | 718 | 733 | 748 | 763 | 778 |
| 674 | 689 | 704 | 719 | 734 | 749 | 764 | 779 |
| 675 | 690 | 705 | 720 | 735 | 750 | 765 | 780 |
| 676 | 691 | 706 | 721 | 736 | 751 | 766 | 781 |
| 677 | 692 | 707 | 722 | 737 | 752 | 767 | 782 |
| 678 | 693 | 708 | 723 | 738 | 753 | 768 | 783 |
| 679 | 694 | 709 | 724 | 739 | 754 | 769 | 784 |
| 680 | 695 | 710 | 725 | 740 | 755 | 770 | 785 |
| 681 | 696 | 711 | 726 | 741 | 756 | 771 | 786 |
| 682 | 697 | 712 | 727 | 742 | 757 | 772 | 787 |
| 683 | 698 | 713 | 728 | 743 | 758 | 773 | 788 |
| 684 | 699 | 714 | 729 | 744 | 759 | 774 | 789 |
| 685 | 700 | 715 | 730 | 745 | 760 | 775 | 790 |
| 791 | 806 | 821 | 836 | 851 | 866 | 881 | 896 |
| 792 | 807 | 822 | 837 | 852 | 867 | 882 | 897 |
| 793 | 808 | 823 | 838 | 853 | 868 | 883 | 898 |
| 794 | 809 | 824 | 839 | 854 | 869 | 884 | 899 |
| 795 | 810 | 825 | 840 | 855 | 870 | 885 | 900 |
| 796 | 811 | 826 | 841 | 856 | 871 | 886 | 901 |
| 797 | 812 | 827 | 842 | 857 | 872 | 887 | 902 |
| 798 | 813 | 828 | 843 | 858 | 873 | 888 | 903 |
| 799 | 814 | 829 | 844 | 859 | 874 | 889 | 904 |
| 800 | 815 | 830 | 845 | 860 | 875 | 890 | 905 |
| 801 | 816 | 831 | 846 | 861 | 876 | 891 | 906 |
| 802 | 817 | 832 | 847 | 862 | 877 | 892 | 907 |
| 803 | 818 | 833 | 848 | 863 | 878 | 893 | 908 |
| 804 | 819 | 834 | 849 | 864 | 879 | 894 | 909 |
| 805 | 820 | 835 | 850 | 865 | 880 | 895 | 910 |

## EXTRA COPIES OF ARTICLES ?

FILL IN PAGE NUMBER AND TITLE OF ARTICLES DESIRED

| Page No. | Title of Article |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

This card good in U. S. and Canada only—Expires Feb. 15, 1959

NAME .....

POSITION .....

FIRM .....

STREET .....

CITY ..... ZONE.....

STATE .....

PRODUCT MANUFACTURED .....

FOUNDRY

# Reader Information Service

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 165 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

*Reader's Service Dept.*

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

*Reader's Service Dept.*

# COLEMAN OVENS

*reduce waste . . .*
*lower costs*

## in every type of foundry

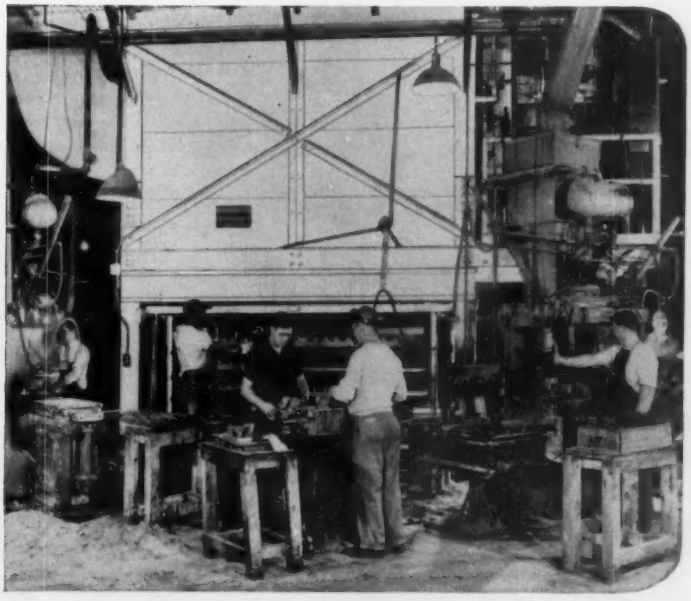
**You can reduce casting scrap . . . cut your labor, material and fuel costs by baking cores and drying molds in Coleman Ovens. Small and large foundries alike find that Coleman Ovens are vital to better quality castings and increased profits.**

**Coleman Ovens quickly pay for themselves out of direct savings in labor, materials and reduced casting scrap.**

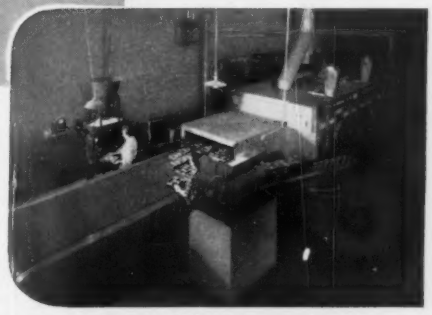
**Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work — grey iron, malleable, steel, alloy, brass, aluminum and magnesium.**

**Profit by this experience — let us recommend, at no obligation, the Coleman Oven for your needs.**

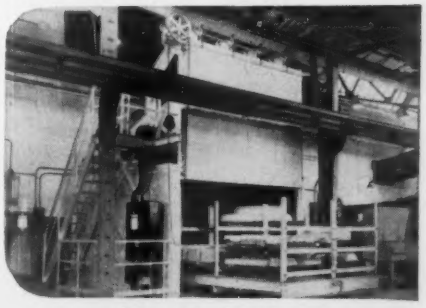
**Write for Bulletin 54**



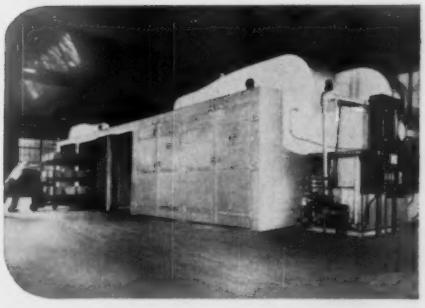
Coleman Tower® Oven in Automotive Foundry



Coleman Dielectric Core Oven
in Brass Fittings Foundry



Coleman Car-Type Oven
in Steel Foundry



Coleman Transrack Ovens
in Pressure Pipe

**A COMPLETE RANGE OF TYPES AND SIZES**

*for every core baking and mold drying requirement:*

**Tower Ovens • Horizontal Conveyor Ovens**
**Car-Type Core Ovens • Car-Type Mold Ovens**
**Transrack Ovens • Rolling Drawer Ovens**
**Portable Core Ovens • Portable Mold Dryers**
**Dielectric Core Ovens**

MEMBER FEMA

**THE FOUNDRY EQUIPMENT COMPANY**
**1821 COLUMBUS ROAD** **CLEVELAND 13, OHIO**

***WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS***



*Circle 594 on Page 51*

# Have you heard about the

# power center for

New A. O. Smith d-c Multiple-Operator unit makes it possible for many operators to weld from one power source with "at the arc" heat control — regardless of how far they're located from the power source! And this single power source can be housed in a dirt-free area — *drastically reduces maintenance costs!*

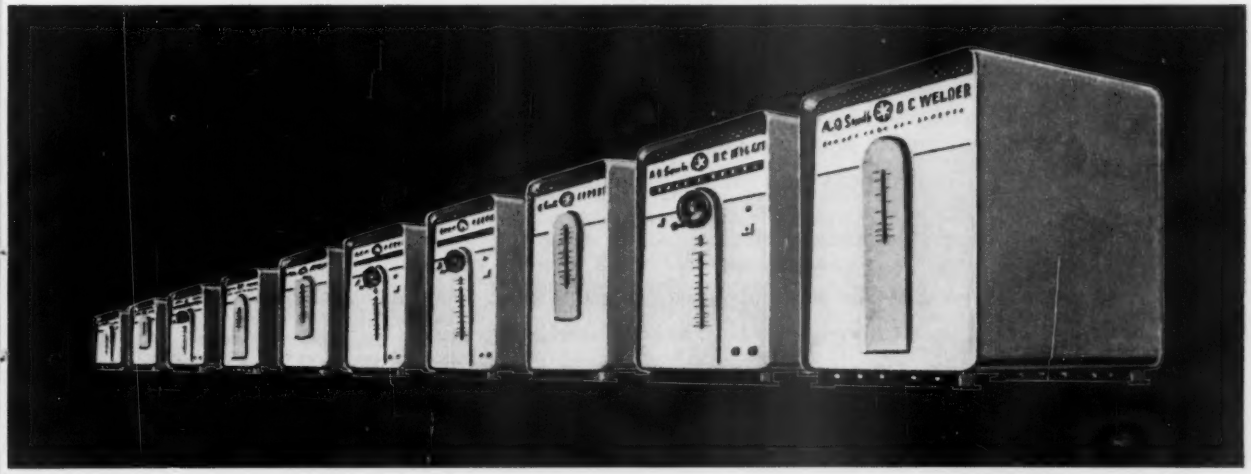
The A. O. Smith 1500-amp, d-c Multiple-Operator machine, at left, is one of three available "MO" units. Others are rated at 500 and 750 amps. These machines are specifically designed to replace or augment existing m-g sets or single-operator transformer welding machines. They are particularly adaptable to foundry work because they allow operation of many arcs (through grids) . . . can be located away from trouble-causing dust, sand and other elements.

The illustrated Model A15000MO is a 1500-amp machine with a 100% duty cycle rating . . . offering 80 open circuit volts, 95% efficiency . . . compact, ageless silicon rectifiers and a 97% power factor correction.

# foundry welding?

A. O. Smith's Multiple-Operator unit is a d-c, constant potential type power source which provides upwards of 1500 amperes of d-c current from a single unit. Individual operator requirements are provided by means of series resistance grids which offer "at the site" amperage selections. For example: Model A15000 is a 1500 ampere unit which can be housed in a dirt-free area or room. A single cable from the power source to a terminal block near the welders' stations distributes current to the individual welding stations where it is drawn off by means of the individual operator's grid.

This A. O. Smith method minimizes equipment investment . . . holds maintenance and standby engineering costs to an absolute minimum. Further, it plays an important part in stabilizing power factor requirements . . . saves substantial sums on costs by equalizing power demands — even during peak welding periods.



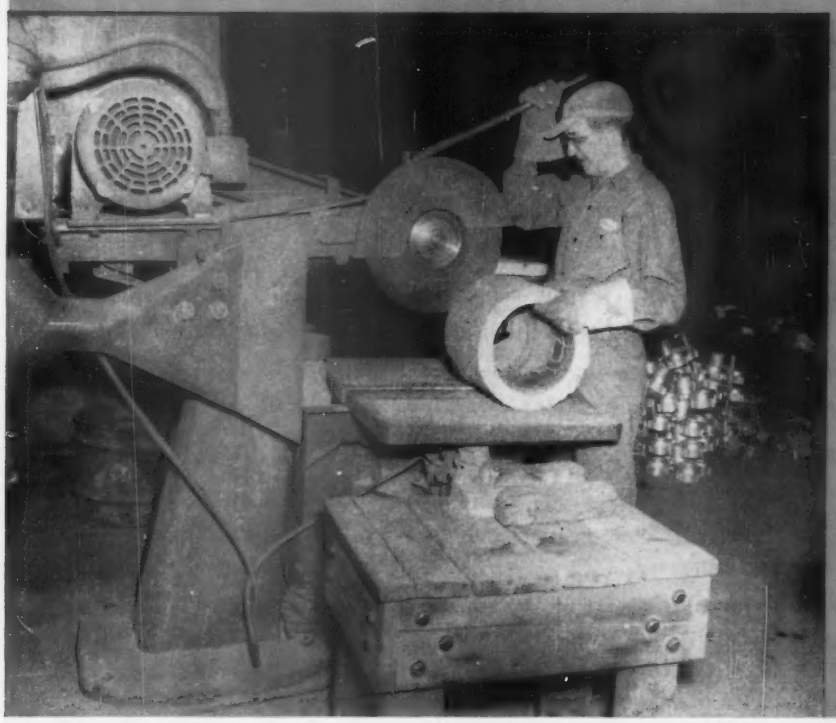

*A. O. Smith also offers a complete line of d-c machines —either selenium or silicon rectifier types, designed and built to provide long-lasting, trouble-free performance. Machine range from 200 to 2500 amperes. For more details on the multiple-operator machines, d-c rectifiers, or complete line of a-c transformers, contact your "man from A. O. Smith" or write direct.*

*Through research* A.O. Smith *. . . a better way*

**A.O.Smith**
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin

A. O. Smith International S. A., Milwaukee 1, Wisconsin, U.S.A.

# FAST, CLEAN CUTS



## with Tabor-Brasive Cut-off Machines

Riverside Foundry & Galvanizing Co., Kalamazoo, Mich., uses Tabor Machine to cut off risers on large bronze castings. Palmer B. Coombs, president, says: "We have used the Tabor Cut-Off since November, 1952, with completely satisfactory results. Cuts are fast and economical."

Tabor-Brasive Cut-Off Machines save man hours, increase production in America's most efficient foundries.

Fast, precise, and trouble-free.

With Tabor Cut-Offs, snagging is reduced, metal saved, and cleaning room costs lowered since castings don't have to be cleaned before cutting.

Complete range of rugged units from 5 to 20 H.P. For ferrous or non-ferrous metals. Tabor handles tough materials like nodular iron or titanium.

For facts and figures that will help you select the right Tabor Cut-Off for your needs, ask for Bulletin 575.

**TABOR**

**THE TABOR MANUFACTURING CO.**
*Division of Turbo Machine Company*
**LANSDALE, PA.**

# Readers' Comment

### Has Betatron Installation

To The Editors:

In the November, 1958 issue of Foundry, a listing of Allis-Chalmers betatron installations is shown in the article entitled "Large Betatron Installation" on pages 216-217.

It is regretted that you did not include in the list the installation at our plant in Lima, Ohio. This equipment was installed in 1953 and is now the property of Baldwin-Lima-Hamilton Corp., being used in quality control and inspection. However, since we have some space available for commercial work for outside sources, it is regretted that the installation at Lima was not mentioned along with the others in the article referred to above.

P. E. Percy
Sales Department
*Baldwin-Lima-Hamilton Corp.*
*Construction Equipment Div.*
*Lima, Ohio*

### Reclaiming $CO_2$ Sand

To The Editors:

In the Questions and Answers Department of the October, 1958, issue someone inquired about the reclamation of $CO_2$ sands. Your answer embraced the application of wet-washing to such sands, and it did not include any indication that such sands have been, and are being, successfully reclaimed by pneumatic scrubbers similar to our Pneu-Reclaim.

You did note Schumacher's comments on simply crushing and screening the used sand, and then using up to 60 per cent with 40 per cent new sand to make usable mixtures. However, work performed in our Beardsley & Piper Technical Center has made it apparent that simple crushing fails to reduce the used sand to individual grains, and that with the passing of time and repeated reuse the base grain distribution progressively becomes more coarse. This factor eventually leads to poor surface finish and the necessity for starting anew with all-new sand mixtures.

Pneumatic scrubbing will reduce all compound clusters to individual grains, remove a high percentage of the used silicate coatings, and repeatedly return a reclaimed product with a distribution very close to that possessed by the original as-new sand.

With a typical Pneu-Reclaim scrubbing unit we have successfully processed and reused a silicate-bonded AFS GFN 135 sand. About 10 per cent loss was suffered on each passage through the scrubbing unit, and the foundry reusing the sand rebonded same with about 70 per cent less binder than normally used in like-purpose all-new sand mixtures. They reported that the resulting castings were, if anything, better than those being obtained from the all-new sand mixes—and they are now installing a complete Pneu-Reclaim system in their foundry.

C. E. Wenninger
Technical Director
*Beardsley & Piper*
*Chicago 39, Ill.*

### Errors in Bronze Article

To The Editors:

In reading over my article, "Shrinkage Prevention in Bronze Castings," in the November issue, I noted a typographical error on page 100, second paragraph under "Feeding T-Sections," which completely changes the meaning of the statement. As originally written this should read, "As indicated in Fig. 28(b), it is possible to eliminate shrinkage by the use of fillet chills, plus a flat chill placed against the body of the intersection opposite the side arm."

There is one other error on the same page, first sentence of the first paragraph of the second column. It should read, "Little needs be said concerning Y and V-sections. . ." The article reads, "T and V-sections."

Clyde L. Frear
Foundry Consultant
3509 *Old Dominion Blvd.*
*Alexandria, Va.*

### Expands Management Committee

To The Editors:

I have just read your editorial "We Need Managers." May I just add my comment—"Amen." I wish I could have stated the problem so well.

I am sure you will be interested to know of the expansion of the AFS Management Development Committee, now composed of the following:

H. A. Forsberg, vice president, Blaw-Knox Co., East Chicago, Ind.;

Circle 597 on Page 51→



MALLEABRASIVE

MORE RIDES

Malleabrasive goes for "more rides"—retains its grade particle size longer—has longer cleaning life, because of its own exclusive metallurgical structure—found in no other metal abrasive.

Tough and shatter-resistant, its slow breakdown rate prevents the excessively fast accumulation of "fines" that slow up cleaning, destroy machine replacement parts and build up cleaning costs.

Yes, cleaning costs are lower with Malleabrasive—proven in plant after plant. We'll show you why—cite your cases. Write us.

THE GLOBE STEEL ABRASIVE CO.
Mansfield, Ohio

Sold by Pangborn Corp., Hagerstown, Md., and by many leading distributors of foundry supplies from coast to coast.

# This new H-25 PAYLOADER®

## replaced two tractor-shovels

Lawrence Parker, Supt. of Rollstone Foundry, Inc., Fitchburg, Mass., says, "We recently replaced two other loaders with the new H-25 'PAYLOADER'. It has cut our overall work period in the night crew operation from 11 hours to 6 hours without changing floor working conditions. Its short turning radius enables it to work in close areas not possible with the two other units. Engine power is geared for operating conditions better than any other loader previously worked or demonstrated in our plant."

**16 hours a day**

Specializing in gray iron, steel and stainless castings, Rollstone keeps the Model H-25 busy 16 hours a day throughout the foundry. It moves castings, unloads new sand, handles coke, cleans sand from the floor, feeds the sand cutter and molding stations, removes refuse.

**Maximum carry capacity**

The Model H-25 with a carry capacity of 2,500 lbs. can carry more load for its weight than any tractor-shovel near its size.

**Fast, easy operation**

The only machine in its class with power-shift transmission having two speeds forward *and* reverse, power-steer for fast, easy operation.

**Reliable traction**

The only machine in its size range with "no-spin" differential to maintain traction.

**Fully protected**

In order to insure long life and low maintenance, full protection is provided by triple air cleaner, three cartridge-type oil filters and oil and grease seals on all vital points.

The outstanding capacity, speed and protected construction of the new Model H-25 will help you keep competitive too. Your Hough Distributor will supply full information on "PAYLOADER" models.

**HOUGH®**

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

**THE FRANK G. HOUGH CO.**
703 Sunnyside Ave., Libertyville, Ill.
☐ Send data on Model H-25
☐ On larger units

Name _____
Company _____
Title _____
Street _____
City _____ State _____

12-A-2


H. W. Johnson, vice president, Wells Mfg. Co., Skokie, Ill.; H. A. Deane, vice president, Campbell-Wyant-Cannon Co., Muskegon, Mich.; Bruce Simpson, president, National Engineering Co., Chicago; Charles H. Ker, president, Dalton Foundries Inc., Warsaw, Ind.; Lester B. Knight, president, Lester B. Knight & Associates Inc., Chicago; R. B. Parker, assistant to president, American Brake Shoe Co., New York; F. W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill.; Frank Dost, president, Sterling Foundry Co., Wellington, Ohio.


C. E. WESTOVER
President
*Westover Corp.*
3110 *West Fond Du Lac Ave.*
*Milwaukee* 10, *Wis.*


### Betting on a Sure Winner

TO THE EDITORS:

Since its birth, this country's overall economic trend has been ever upward. It has to be—it's the inherent nature of the beast—and it always will be. It's as certain as the power of the sun. And every period of prosperity has been greater than the one before. The pauses in between let us catch our breaths and give us a chance to ruminate. These pauses can be turned to good account or they can be frittered away.

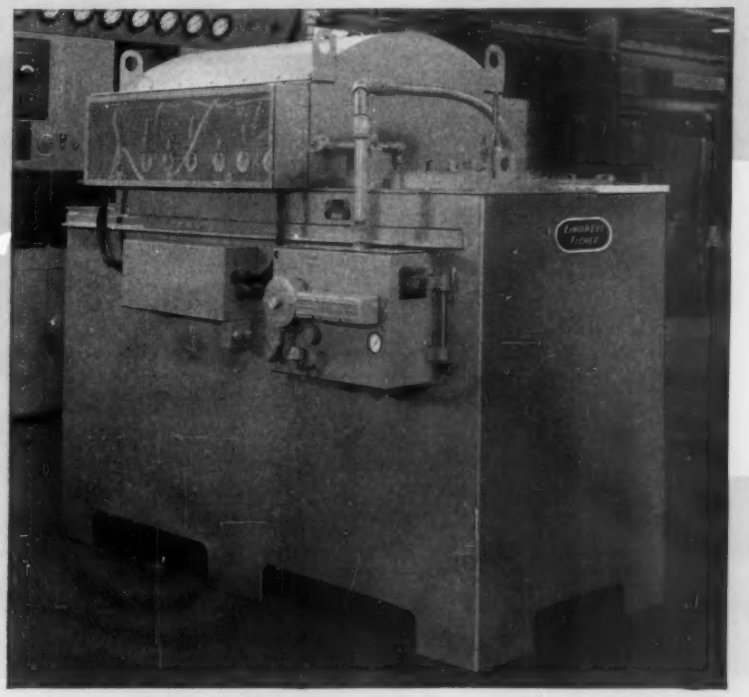
Nobody questions the sagacity of the advice to prepare for scarcity in time of plenty. Isn't the reverse equally as wise: Prepare for plenty in time of scarcity?

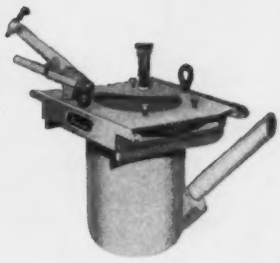
During boom times most of our energies are concentrated on production. During slack times a good part of our energies should be devoted to preparing our facilities for lower production costs and high speed in anticipation of the next boom.

Any high school boy would consider these comments to be elementary. What do they mean to the foundry tycoon? They could mean the difference between riding the crest of the next prosperity wave or foundering in its undertow. Does any one doubt that we will ever have prosperous times again? If so, he is selling America short and that is rather foolish. It doesn't even take courage to invest now in modern high-speed foundry production equipment—it just takes common sense and a little faith in our own judgment. It's like betting on a sure winner!


E. B. REDHEAD
Chief Engineer
*Wm. H. Nicholls Co. Inc.*
*Richmond Hill* 18, *L. I., N. Y.*

# There's a Lindberg Aluminum Holding Furnace Just Right for Your Specific Job





This is Little Joe, the Lindberg Autoladle, the first practical automatic aluminum ladling unit yet devised. An exclusive feature of Lindberg electric resistance holding furnaces, "Little Joe" makes automatic casting of aluminum fast, dependable and economical.

Electric resistance holding furnaces for aluminum have been a specialty of Lindberg engineers for years. These furnaces have proved themselves in superior operation in varied industries, the world over. Now Lindberg offers a complete line, newly-designed, available in capacities of 1,000, 1,500, 2,000, and 3,500 lbs. If your production processes require proper holding of aluminum you can depend on Lindberg to provide just the right equipment for the most efficient and practical answer to your problems.

Lindberg makes a wide variety of melting and holding furnaces for aluminum, brass, bronze, tin, zinc, lead and other non-ferrous metals. These include aluminum induction, nose-pouring crucibles, electric resistance holding furnaces and big reverbs. For foundry, permanent mold or die-casting plant, independent or captive, there are Lindberg melting and holding furnaces to fit every need.

If your problem in this field needs a special solution Lindberg's design staff can find it. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality, or write Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

**LINDBERG heat for industry**

# *High-Speed* Molding with
# STERLING FLASKS

- You can operate your production foundry at top efficiency if you standardize on Sterling Flasks. Made from hot rolled high carbon steel, with controlled copper bearing, Sterlings are welded into a single rigid unit. You get extra strength with less weight, for easier handling. Even under rough usage, you are assured of obtaining both accuracy and speed in molding. Available in a variety of styles and shapes . . . engineered to meet your individual needs. Write today for your copy of the Sterling Flask Catalog.

Sterling

**STERLING NATIONAL INDUSTRIES, Inc.**
Founded 1904 as Sterling Wheelbarrow Co.
Milwaukee 14, Wisconsin, U. S. A.

Subsidiary Company:
STERLING FOUNDRY SPECIALTIES LTD.
LONDON • BEDFORD • JARROW-on-TYNE — England

***Manufacturers of Foundry Equipment for Almost a Half Century!***

A7-4514-1PCR

December 1958

# A Far-Reaching Program

Many foundries are producing better castings. Since the beginning of World War II, much progress has been made in the development of better physical and mechanical properties, in the consistent ability of plants to produce a high-quality product, and in new and improved types of cast components capable of meeting exacting specifications.

A corresponding growth in the use of cast metals has not developed. It has been held back by the failure of foundrymen to inform customers and prospective customers of their progress. Managements, with leanings more toward production than to sales and promotion, have been slow to give their product the hard-sell technique. They have not recognized that the old mousetrap philosophy long since has been outmoded. Buyers do not beat a path to your door, regardless of how good the product. You must take the message to them.

Of course, advances have been made. Trade associations have been using tools such as handbooks, specification and data sheets, motion pictures, slide films, and a somewhat limited display advertising program to carry the message of progress in cast metals to designers and buyers. Progressive individual foundries have made use of all these mediums, plus interesting and attractive booklets giving information on practice and products. No doubt these excellent efforts have increased sales, although they have not developed the full marketing potential of the cast metals industries.

But this picture also is changing. Now, 41 producers of malleable iron castings have formed the Malleable Castings Council and will launch an educational and promotional campaign on standard and pearlitic malleable iron castings. This announcement is one of the most gratifying developments among castings producers in many a year, and it is of outstanding significance to all other foundry industries. The campaign will cost approximately $200,000, a tremendous effort for one of the smallest groups, plantwise, in the foundry industries.

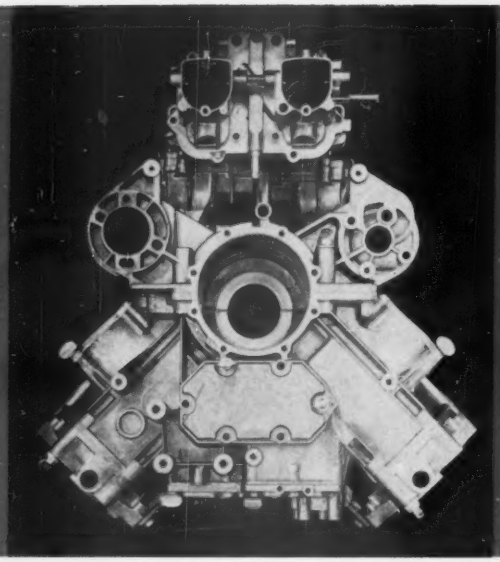
Purpose of the new Council, according to its president, Robert J. LaMarche, ". . . is to inform engineers, metallurgists, purchasing agents, production and administrative men about the many useful and highly valuable qualities of malleable iron. We have concentrated so long on producing a superior product that we have neglected the selling job. Current developments in malleable irons are vastly increasing the number of applications where malleable castings cannot be excelled for performance and economy. Our purpose is to provide information to the industry so that people will know when they should use malleable."

Our congratulations to the malleable castings industry for this farsighted, far-reaching program.

And we hope it will provide an incentive for greater action on the part of other foundry industries.

Frank G. Steinebach

Editor



# V-4 Motor Block Is DIECAST IN

***Pioneer production line for diecast aluminum V-4 cylinder blocks is in operation at Johnson Motors Div., Outboard Marine Corp. Automotive people are greatly interested***

Semiassembled V-4 engine shows intricately cored sections, crankcase, and two-barrel carburetor

By JACK C. MISKE
*Associate Editor*

THE first diecast V-4 aluminum engine blocks are coming off a production line at Johnson Motors Div., Outboard Marine Corp., Waukegan, Ill. At maximum production, 30 such blocks are produced every hour—one every two minutes.

These blocks, which are for use in a new 50-hp outboard motor, are made with cast iron cylinder sleeves and a bronze half-bushing, all cast in place. As cast, including inserts, gate, runner, and biscuit (or sprue), the block weighs about 37 lb, of which 27¾ lb is the aluminum shot.

**Diecasting Machine**—Blocks are cast in a machine built to the company's specifications. Locking pressure is 800 tons and the die opening is 30 in. The unit is made with a cast steel frame, and the die had to be tailored to fit. The shot plunger has a 22 in. stroke and is 5 in. in diameter.

**The Die**—Weight of the die is 14,700 lb. In its construction, a preliminary block design, a mockup, and a prototype sand casting were submitted to production by engineering. Preliminary die layouts then were made and alternative designs studied to determine such production problems as position of the casting in the die and location of the gating and the parting line.

Once a promising tentative die design had been drawn up, a wooden mockup was constructed to test such operations as slide movement, loading of inserts, and removal of the casting from the die. A workable design eventually was achieved, and the die was made. Johnson makes about half of its own dies, but the die for the block is one of the other 50 per cent. It was made by an outside source. Johnson hopes to make 250,000 block castings from it. Both the shot plunger and the die are made of a steel with the following composition, by percentages: C, 0.40; Cr, 5.40; Mo, 1.20; V, 1.00; Si, 1.00; Mn, 0.30.

Six core slides operate radially in relation to the central die cavity. All are on the movable portion of the die. Before the platens are closed, four of the slides move in under hydraulic pressure. The cam pins, which project at an angle from the face of the stationary part of the die, engage in holes in the remaining two slides and move them in as the die closes. Shape of the casting and its position in the die determined location of the core slides, all of which would have been hydraulically operated if space had been available.

It was discovered that the core slides restricted gating to the bottom of the casting, as it sits in the die, and the shot enters the die cavity at that point. The block is cast so that the cylinders extend down and out at opposed 45-degree angles. The parting line runs vertically between the two banks of cylinders, about halfway between the end faces of the casting.

**Inserts Were Problem**—As mentioned previously, the block includes four cast iron cylinder liners or sleeves and a bronze half-bushing, all of which are cast in place. A loading device was developed in the form of a fixture on a swinging support in front of the machine. The operator places the various inserts on locators on the fixture and swings it into place in the die opening. The sleeves are preheated by electric strip heaters in the loading chute from which the operator takes them.

With the fixture in place properly, against stripper plates on the die face, the operator trips a control valve. Hydraulic pressure pushes the half-bushing into a wedge-type locating nest in its core slide and pushes the four sleeves onto their respective core pins. A wedging action retains the bushing, and the sleeves are retained by gravity. A limit switch prevents the hydraulic controls from operating unless the loader is positioned correctly.

J. G. Rayniak, president, Outboard Marine Corp., with aluminum diecast V-4 block at left and rear center, shell molded crankshaft center front, and a diecast aluminum underwater housing at the far right

The sleeves are rough-turned to aid their retention in the aluminum when the block is cast.

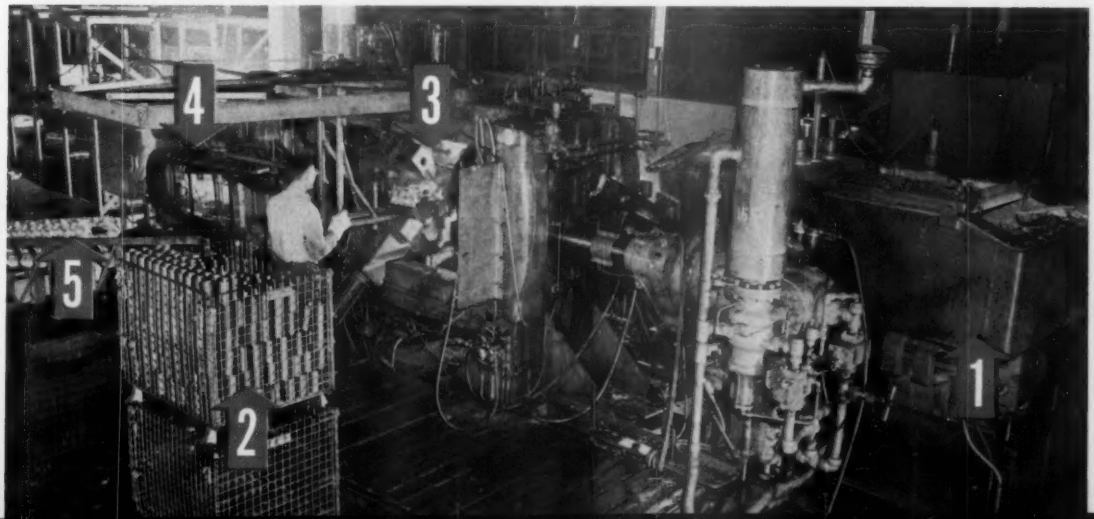
**Removing the Casting**—Because the 37-lb weight of the block made manual removal from the die impractical, Johnson personnel designed an unloading device. They installed an extra hydraulic cylinder in the die to eject the casting and built a tray-type rolling fixture which moves into the die opening, receives the casting as it is ejected, and rolls out. The extra hydraulic cylinder is mounted on the die ejector to move the casting the last 5 in. into the unloading tray. The die ejector itself has an 8-in. stroke, and a total of 13 in. is required. The ejector plate operates a total of 17 ejector pins which push the casting out of the die as it opens.

**Melting**—Metal is supplied by a combination of two furnaces, both induction types, like almost all of the more than 100 furnaces used in the plant. The only exceptions are two reverberatory units used to melt dross and scrap containing iron inserts.

Ordinarily, Johnson does its melting in one of two central melting areas. A battery of six 200-kw induction furnaces, each with a capacity of about 1000 lb per hour, melts purchased aluminum scrap.

Slugs from every heat alloyed in this area are analyzed in as little as 2 minutes with a Quantometer. Remelt and ingot are melted in another area, which includes two 200-kw and nine 60-kw induction units. Metal from both of these areas is moved in manned metal carriers on overhead conveyors to 20 or 30-kw induction holding furnaces at each diecasting machine. More than 100 of the latter are in use. Daily checks are made on metal

Over-all view of block casting operation: 1. Holding furnace and automatic ladling unit. 2. Cast iron cylinder inserts. 3. Removing casting from die. 4. Chute in which inserts are loaded. 5. Cooling chute leading to trim press



Molten aluminum is poured from 200-kw induction melting furnace to automatic ladling unit

in the remelt-ingot melting area and in the holding furnaces.

At the machine which casts the engine blocks, metal is melted on the spot, in a 200-kw unit. This furnace tilts hydraulically to pour metal into the second, which is both a holding furnace and an automatic ladling unit. All metal usually is secondary ingot, and a Quantometer check is made once per shift.

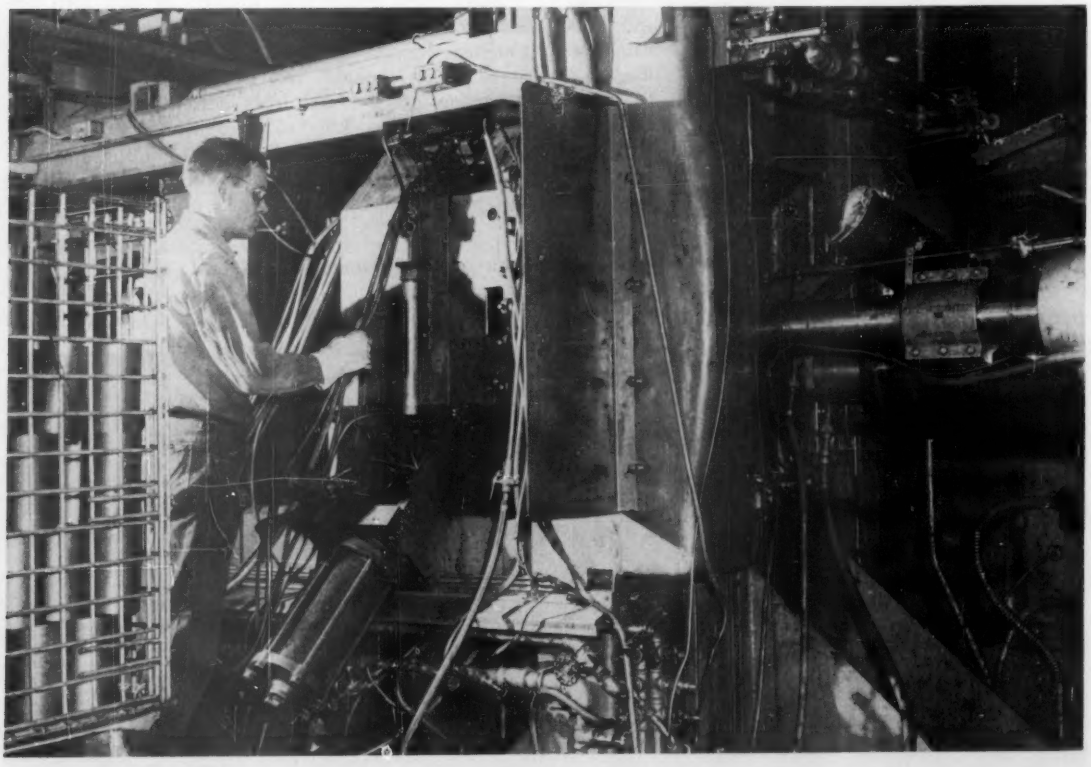
**Metal Analysis**—The alloy used for the block casting is somewhat similar to commercial alloy 13, which is used widely in diecasting and permanent mold applications. The alloy used for the block has the following composition, by percentages: Si, 10-12; Cu, 0.60 max; Mg, 0.10 max; Mn, 0.30 max; Zn, 0.50 max; Fe, 0.4 to 0.80 max; Ni, 0.50 max; Cr, 0.30 max; Ti, 0.30 max; other, 0.20 max; balance Al.

**Finishing Operations**—As castings are unloaded from the diecasting machine, they enter a chute which takes them to a trim press adjacent to the machine. Blasts of air cool them to handling temperature as they make the trip, and an operator at the trim press removes gate, runner, and biscuit. Another press trims flash from holes and passages.

After the trimming operation, castings are degreased and shot blasted. They then are taken to the machining department. There they also are impregnated to resist corrosion. After machining, they are tested individually for pressure tightness in a water tank under 30-psi pressure.

**A Look at the Future**—This pioneering operation at Outboard Marine is extremely interesting in itself, but no more so than the question of what it may portend for automotive engines. It's no se-

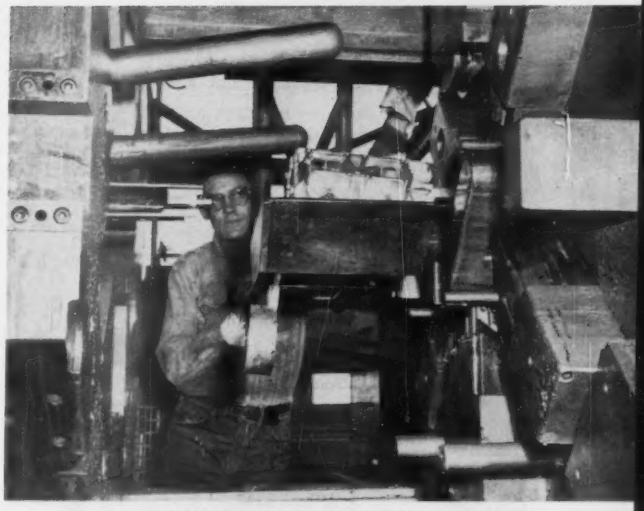
View of die and diecasting machine during the holding cycle (or solidification time). Metal is ladled automatically from induction holding furnace



cret that the automobile companies are actively investigating the possibilities of aluminum engines, although not necessarily in terms of diecastings. Permanent and semipermanent molding also are under close scrutiny, and General Motors already is producing a diesel truck engine with sandcast aluminum components.

In any event, the interest in aluminum engines is definite. One sign of it is the fact that representatives of the car companies have made many trips to Waukegan to observe the diecast V-4 block line. J. G. Rayniak, president, Outboard Marine Corp., points out that the problems involved in diecasting a V-8, four-cycle engine would be greatly different from those his company faced in producing the two-cycle, V-4 block. Other factors which would complicate the problem include whether or not cylinder liners were used and whether the cylinder head was cast separately or as part of the block.

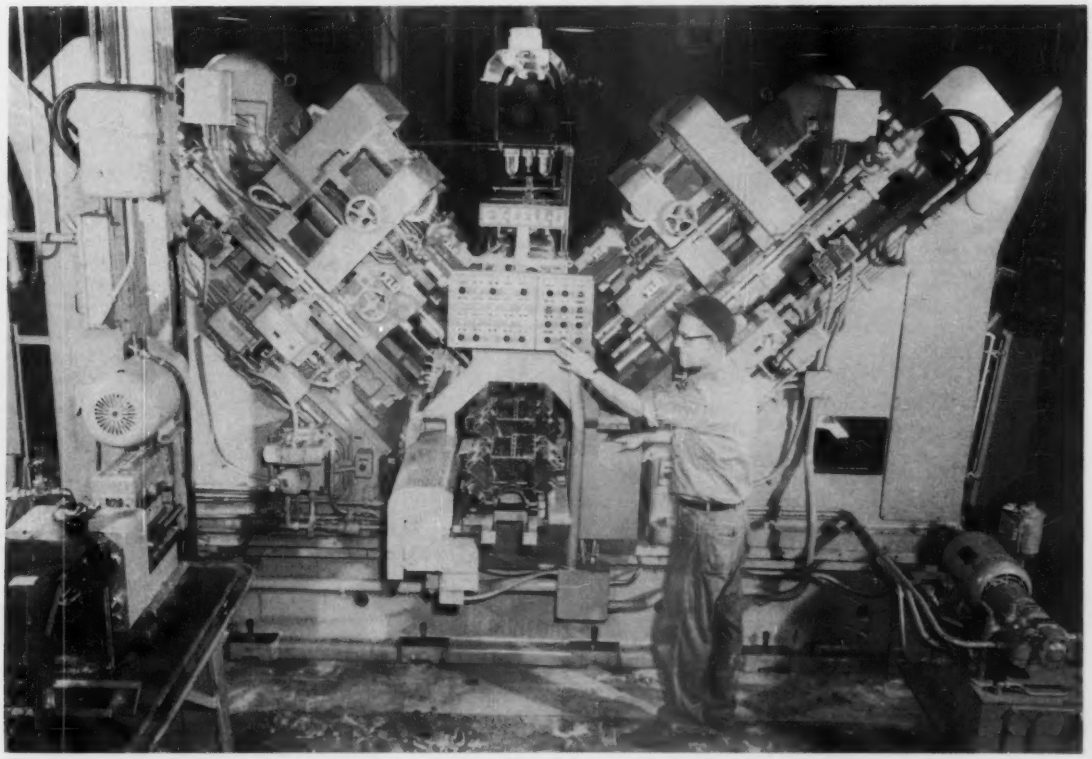
Nonetheless, Mr. Rayniak has a great faith in the potentialities of the diecasting process. He has believed in it and employed it for many years to produce parts for saws and lawnmowers made by Outboard's Pioneer Saws and Lawn Boy divisions, respectively, as well as for the outboard engines made by three divisions, Johnson Motors, Evinrude Motors, and Gale Products. In keeping with this faith in the process, he has said, "Before long the automobile people will be diecasting their cylinder blocks in aluminum. Plenty of them have been in here to see how we did it on this 50-hp motor. They'll have to go to aluminum diecastings because they've got to cut weight and cost."



Close-up of block as it is ejected from die into unloading fixture. Note core slides on the die

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

Unit made especially for performing milling operation on the V-4 blocks is representative of many special-purpose machines required at Outboard Marine



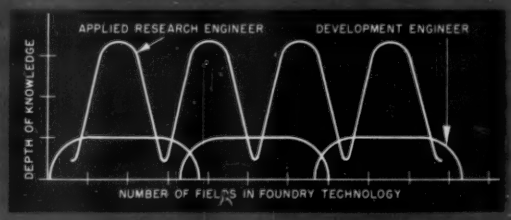



Fig. 1—Hypothetical curves on this chart illustrate the depth and breadth of knowledge considered desirable in the two principal types of laboratory engineers

# New Laboratory Links RESEARCH and PRODUCTION

*The personnel balance, aims, present and future projects, and facilities of General Electric Co.'s new Applied Research and Development Laboratory at Schenectady, N. Y., are described*

By ROBERT H. HERRMANN
*Associate Editor*

Fig. 2—Dr. Jack Keverian, center, laboratory manager, meets with laboratory engineers. Left to right: Hans Missbach, supervisor—foundry laboratory operations, K. D. Scheffer, J. G. Henzel Jr., F. D. Lordi, B. J. Alperin, Dr. J. K. Sprinkle, Dr. T. P. Floridis, and M. H. Dovison

Fig. 3—Chemist uses an x-ray emission spectrometer to analyze metal for several elements

WITH the opening of its new Applied Research and Development Laboratory at Schenectady, N. Y., General Electric Co. provides a vital link between pure research in new materials and processes and application of research developments to castings production in its diversified foundry operation.

To do that job a staff of three development engineers, four applied research engineers, and twelve technicians working under the direction of Dr. Jack Keverian, manager, have at their disposal in this new facility one of the most modern and fully equipped laboratories in the country.

Dr. Keverian attaches special importance to a proper personnel balance for success of a laboratory operation. He feels that this has been achieved at GE. There the work is divided into four major technical areas: 1. Melting and refining. 2. Casting and solidification. 3. Molding and refractory materials. 4. Cast structures and properties.

A specialist, the applied research engineer, covers each of the sections. The background of each man must include advanced technical training in his major technical area. His responsibility is to search for new knowledge and attain greater understanding in that area. Development engineers should have broad knowledge of foundry technology. Their responsibility is to evaluate, combine, and optimize new knowledge from technical areas and convert it into foundry practice. Fig. 2 graphically portrays the knowledge coverage desirable in these two groups of engineers. Technicians must be adept and accurate in experimental, testing, and evaluation work.

**Aims of the Laboratory**—Basically the laboratory tries to do three things: 1. Apply existing knowledge to solve specific, recurrent technical foundry problems. 2. Gain a better understanding of basic foundry processes by searching for new knowledge to solve specific problems in each of the four technical areas. 3. Conduct evaluation and pilot plant work.

In following that line of endeavor the laboratory will attempt to solve problems at the request of the foundries. It also will originate its own projects with the purpose of turning over to the foundries usable results of experiments on new materials and processes. Work for GE foundries constitutes 85 per cent of the activity; the balance is devoted to similar work for other GE departments.

An outline of projects is set up each year, and every effort is made to allocate the laboratory's capacity and money equitably among the projects requested by the various foundries and research programs initiated at the laboratory. Naturally such a program is flexible and may be altered during the year to meet problems which arise.

**Present and Future Projects**—Current studies deal with methods of eliminating gaseous impurities in molten metals. A 9-ft-diam vacuum degassing chamber is being used in the work. Improved methods of vacuum melting and processing of alloys to reduce impurities and improve casting properties also are being studied. The ceramics engineer is experimenting with ceramic shell investment molding techniques to improve precision casting methods. In the field of heat transfer, methods are being studied for reducing the quantity of metal needed for risers.

Dr. Keverian has cited some of the needs of the foundry industry in a long-range program of study opportunities for the laboratory. A greater understanding is needed of chemical composition, additives, temperatures, and temperature cycles during melting and refining of metals to determine their influence on casting properties.

There is much to learn about application of fluid flow and heat transfer principles to the flow and solidification of metals. Methods of influencing flow pattern and solidification can be studied to de-

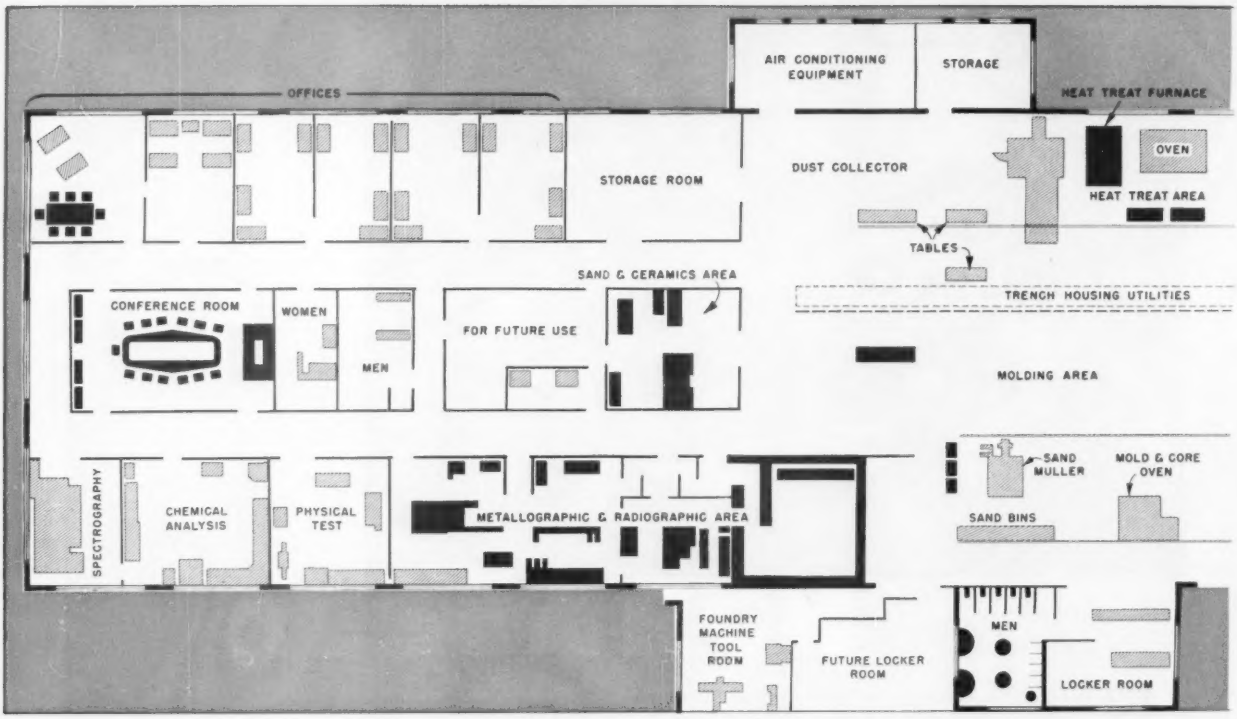



Fig. 4—Layout of the GE Applied Research & Development Laboratory

termine their possible application for improving casting quality and properties. Studies already are under way on phases of this work.

Experiments are being conducted with new mold materials and molding techniques. Factors influencing the properties of mold materials also are being studied. The goal is improved dimensional reproducibility, accuracy, and quality in castings.

**Laboratory Facilities**—The 22,000-sq-ft laboratory is divided into large and small areas in which various studies and experiments can be conducted without interference with each other. In addition to a full complement of standard laboratory equipment and pilot scale production equipment, the facilities include several unusual items.

For instance, the large work area has compressed air, natural gas, nitrogen, and hydrogen piped the length of each side of the building. A depressed channel covered with metal plates runs down the center of the floor. It houses a water line with hose connections, floor drains, and 220 and 440-v electrical outlets.

Melting equipment includes a 50-lb capacity, 50-kw vacuum induction furnace designed to permit charging, mold heating, and mold pouring under vacuum. Provision also is made for introducing gases through a drier into the vacuum chamber for controlled atmosphere work.

A 9-ft-diam, 10-ft-high vacuum chamber for degassing metals melted in air will hold a 10-ton-capacity ladle or permit stream degassing at the rate of 5 tons a minute. For the latter technique a special ladle with a bottom-pour opening which fits an opening in the water-cooled top of the chamber is used. The chamber opening is sealed with a thin metal diaphragm during evacuation of the chamber. It is melted when molten metal from the transport ladle hits it. The vacuum pump for the chamber is a high-pressure steam ejector type which evacuates through five venturi tubes mounted in stages. Pumping capacity of the unit is 60,000 cfm at 1mm. It takes three minutes to bring the chamber down to a pressure of 1mm.

A metallograph is equipped with a polaroid camera over the viewing panel for taking photomicrographs. Other attachments permit phase contrast studies, microhardness testing, macro scale viewing, and grain size measuring.

Analyses of alloys for such elements as chromium, cobalt, columbium, copper, iron, manganese, molybdenum, nickel, tungsten, and vanadium can be made in a few seconds by an x-ray emission spectrometer. Other materials also may be analyzed because the machine handles solid, powdered, or liquid samples. Briefly, the machine operates by directing x-rays of sufficient energy against the sample to cause atoms of the sample to emit secondary x-rays. Each element has its own characteristic emission wave length. The secondary x-rays are channeled to an analyzing crystal which disperses the various characteristic wave lengths. Qualitative and quantitative data are obtained.

The laboratory also has a four-curie cobalt 60 source available for radiographic examination of castings.

---

• An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

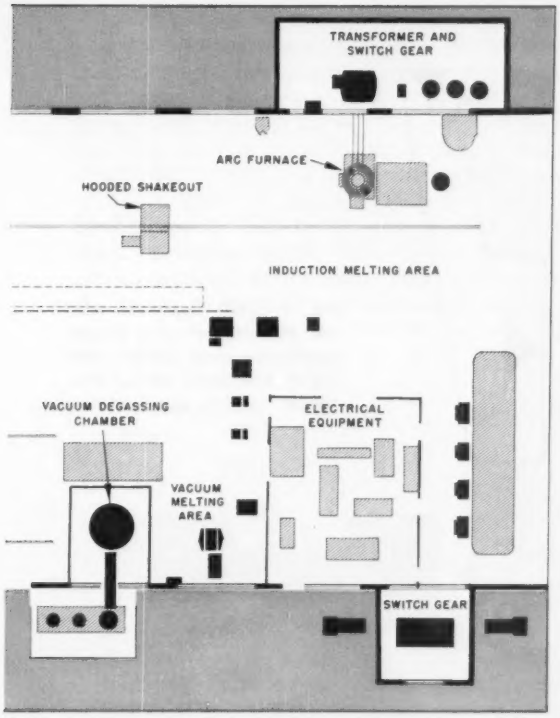


Fig. 5—Large vacuum chamber permits studying techniques of removing impurities from molten metal under a vacuum

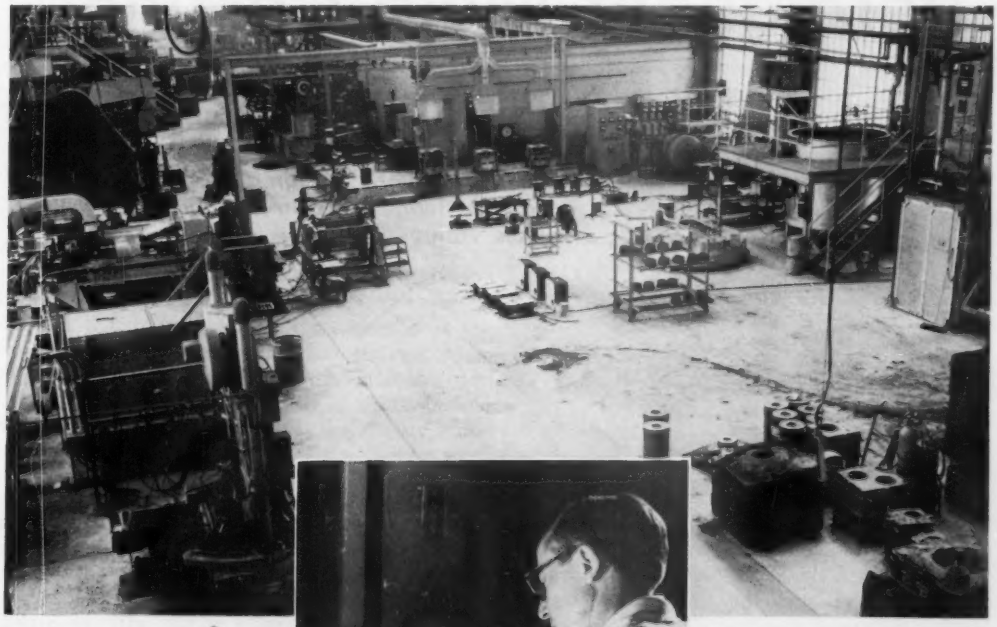


Fig. 6—Over-all view of laboratory work area. Heat treating, hydraulic cutting, and arc hot topping areas are at left. The vacuum chamber, top removed, is at right; the vacuum melting and pouring equipment is shown at top right corner

Fig. 7—Technician in Specialty Casting Development Component of the laboratory is shown attaching a wax turbine bucket pattern to a sprue in preparation for experiments with the monolithic ceramic shell mold investment casting process

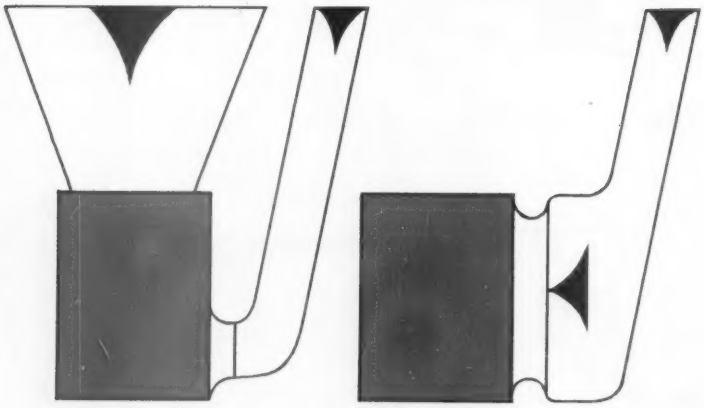


Fig. 1—(Left) Separate runner and feeder for a simple permanent mold casting and (right) combined runner and feeder for the same casting

# Feeding Systems for Permanent Mold Castings

***Designing of runners, risers, and feeding systems for permanent molds is largely a matter of combining sound common sense with a good knowledge of casting fundamentals. The author discusses various principles involved***

By D. MILLER

AFTER a permanent mold has been filled with molten metal, the main problems of the founder begin—in the form of shrinkage holes, shrinkage marks, cracking, and the resultant effects of solidification shrinkage.

Solidification shrinkage may be defined as follows: When solid metal is melted, it increases in volume. Aluminum alloys, for instance, increase in volume by 7.6 per cent, and when the metal solidifies in the mold or die it reverts to its original volume. Feeder heads are added as a sort of reservoir to replace with molten metal the volume of metal retracted into the casting. On the other hand, contraction after the metal is solid cannot cause internal voids but results in an over-all change in dimensions. Consequently, an allowance is made in the mold for linear contraction according to fairly well-defined standards and varying with the alloy being cast.

**Functions of Runners and Risers**—In designing a permanent mold, the runner is positioned so that it will permit the mold to fill with an unbroken stream of metal, at a controlled uniform speed. The hydrostatic head height above the casting is such as to give sufficient pressure to obtain a clean-cut definition of casting form. A feeder has a function only of furnishing liquid metal to the casting to compensate for the volume loss due to shrinkage on solidification, which is otherwise the cause of voids and microshrinkage, etc., in the casting. The feeder may, in some instances, also supply a hydrostatic head if so desired.

Disregarding economy, one could always produce

a sound casting by the addition of ample feeders, and by allowing extra machining on the casting. The object of this paper, however, is to indicate the minimum amount of feed metal that will produce a solid casting. There is an exception to this, however, since it is well known that permanent molds need to work at a temperature of approximately 200° C (392° F), and some designers make their feeding system deliberately large so that the heat from the feeding system will keep the mold at the correct working temperature. This is regarded by the author to be false economy—since the melting costs and metal losses of this method are higher

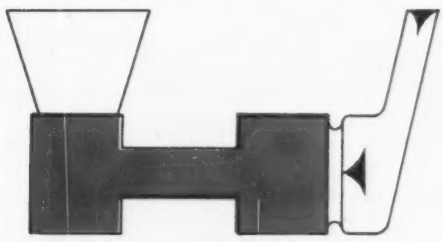


Fig. 2—When the combined runner-feeder cannot supply feed metal to the entire casting, it is necessary to provide auxiliary feeder heads

than they would be if an alternative heating method, such as a gas flame, were used.

To economize further on melting costs (for this is always a basic objective) the runner and feeding system can be combined, as illustrated in Fig. 1. This combination can be achieved successfully in the majority of cases if the proportions of the runner-feeder are sufficient to permit replacement of the liquid metal lost to that portion of the casting which it has to feed. Additional risers must be added to furnish liquid metal to any other portion of the casting that the feeder-runner cannot supply, as illustrated in Fig. 2. However complicated the casting may be, it can be regarded as being broken down into areas requiring feeding and heads added accordingly, then each portion of the casting must be looked upon as an independent feeding system.

**Feeding Positions**—For the various designs of castings, no definite position for the runner can be recommended here; so much depends on the design of the die parts which a designer is forced (through the shape of the casting in question) to adopt, such as where the main mold split-lines will be, where there are cores that necessitate withdrawal, necessity for ease of movement of various mold parts by manual labor or mechanization, etc.

After considering these factors, a designer is generally left with about three ways in which he is still able to make his casting with a view to arriving at the ideal position for the runners and feeders. These choices generally are: Whether to make it vertically or horizontally, and if in the horizontal position, whether to cast it with various projections of the component downwards or upwards.

The designer can consider at this stage the advantages of tilting the mold during pouring. He must also consider economics of production, such as what is the cheapest method to produce the mold in the toolroom. Thus he is faced with obtaining his eventual die design with due consideration to four main factors: 1. Design dictated by the shape of the object to be cast. 2. Design to obtain best results to enable the casting to be run and fed correctly with easily located runners and feeders. 3. Design based on incorporating a minimum number of working parts and operations. 4. Design based on economic mold cost.

**Hydrostatic Head**—Having arrived eventually at the position in which to mold the casting, the designer must give a hydrostatic head to the casting; that is, he must decide at what height the runner will be above the casting proper. On 99 per cent of permanent molds, the hydrostatic head varies between 3 and 6 in., depending on the size of the casting in question. The hydrostatic head above the casting defines the pressure in the mold, and this has an important effect on the soundness of the casting. The greater the height of the runner, the greater is the possibility of sound castings. Unfortunately, however, the greater the height, the more possibility there is of turbulence during pouring of the metal, unless this is carefully controlled by tilting the mold during pouring, or by incorporating a well-designed ingate to control the supply of metal. The hydrostatic head has no effect on the

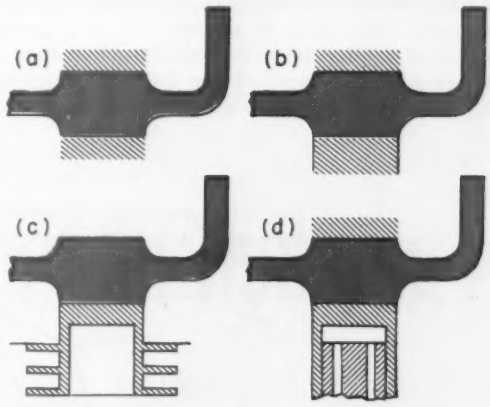



Fig. 3 — Methods of improving directional solidification. (a) — Die coat removed. (b) — Die coat removed and copper plug incorporated in the die. (c)—Die coat removed and copper plug air cooled. (d)—Die coat removed and water cooling employed

"closeness" of the crystal structure of the metal, but under high pressure, volume loss of the alloy that takes place on solidification is more easily replaced.

The pressure exerted on the molten metal by the hydrostatic head is determined surface area multiplied by the hydrostatic head height, multiplied by the weight per cubic in. of metal. It can

be seen that the uppermost part of the casting will have the least pressure exerted on it, and the lower part of the casting will receive maximum pressure. It will be obvious, therefore, that the most important parts of a casting should be located in the lower part of the mold.

**Proportions of Feeding Systems**—As stated previously, the purpose of a feeding system is to furnish liquid metal to the casting to replace that volume lost on solidification. Taking aluminum alloys as an example, the volume contraction of a casting on solidification is in the region of 7 per cent. However, the feeding system which is to be superimposed is also contracting at the same rate; thus the minimum feeding system should be 7 per cent of the volume of the casting, plus 7 per cent of that of the feeding system, and so on with diminishing increment ad absurdum, but from this a safe margin of 10 per cent of the casting volume can be taken.

The second point with regard to feeding systems is that the feeding system must remain molten longer than the casting, to insure the supply of liquid metal and adequate hydrostatic pressure. Ideally, for permanent mold castings of even section, the feeding system should be equal to the volume of the casting, plus 10 per cent for volume contraction. In other words, a casting requires a maximum feed of 110 per cent of its volume.

**Aids to Solidification**—With sections of equal proportions, it is possible to feed adequately without any voids if it is assured that the supply of liquid metal is not cut off. It is also possible, to a certain extent, adequately to feed uneven sections, subject to being able to control the speed of solidification of the metal. The speed of solidification of a permanent mold casting can be increased at selected points by using one or more of the following methods: (a) Removing the die coat. (b) Adding copper plugs. (c) Air cooling. (d) Water cooling (Fig. 3). There are also a number of other methods, such as coring a hole, altering thin sections to feed a thick section, etc.

The efficiency of the feeding system can be improved further by keeping the metal in it liquid until after the casting has solidified. This is done by insulating, gas or electric heating, applying exothermic materials, etc. All these methods are important and conducive to reducing the 110 per cent ratio of feeding system to casting, but it is of major importance to be able to define what parts of a casting are self-feeding.

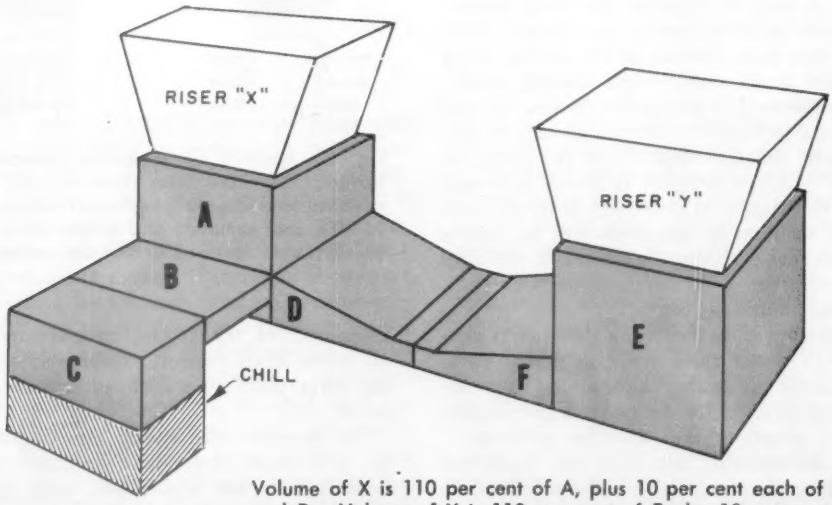
**Self-Feeding**—An example of maximum feeding efficiency is a billet mold. Here, with slow teeming, the billet is being fed with an unbroken stream of molten metal and the ladle is acting as the reservoir of liquid metal to replace that lost in volume contraction, thus producing a casting with the minimum of feeding system.

Take, for example, a simple two-block casting, the top block having a volume of 4 cu in. and the bottom block attached to it having a volume of 2 cu in. If one assumes that the top block was the feeding system, it would adequately feed the bottom block and the feeding system required to feed the casting would be 110 per cent of 4 cu in., plus 10 per cent of 2 cu in. (see Fig. 4). These rules apply to any shape of casting so long as each part of a casting is considered as a separate feeding system; then the location, shape, and size of suitable reservoirs for providing feed metal becomes a much simpler matter.

Editor's Note: This article is reprinted from the *Foundry Trade Journal*, London, England, and is presented here through the courtesy of that publication.

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

Fig. 4—Diagrammatic representation of the proportions required for the feeding of a casting, using a chill to promote progressive solidification




Volume of X is 110 per cent of A, plus 10 per cent each of B, C, and D. Volume of Y is 110 per cent of E plus 10 per cent of F

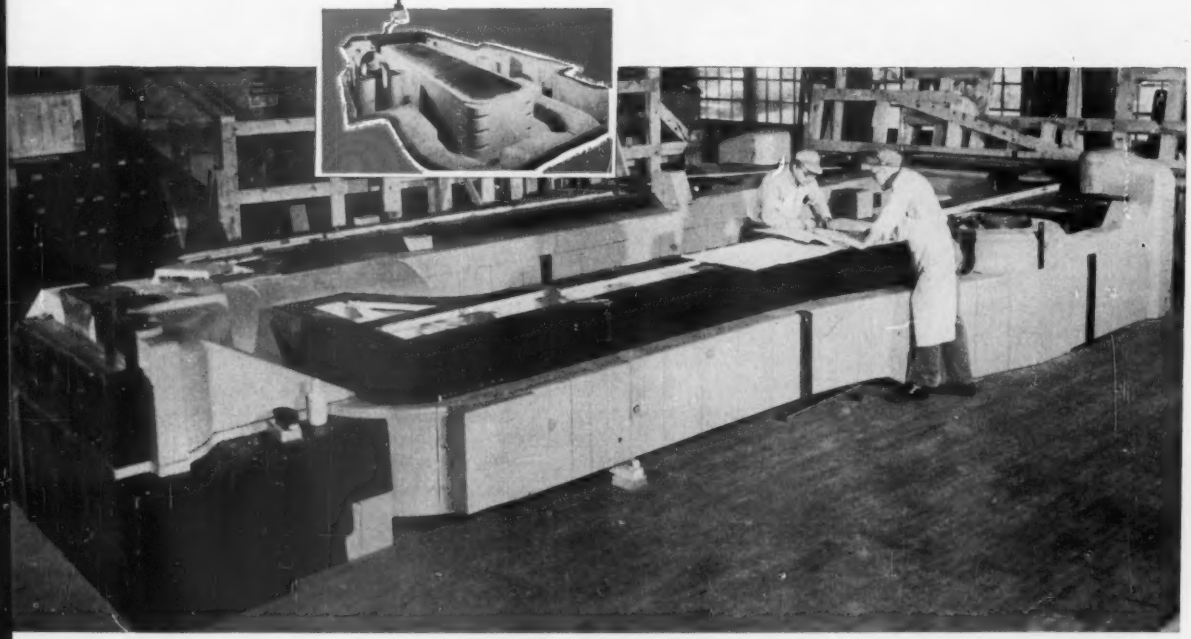
Pouring the 150-ton casting. Metal enters the mold simultaneously from three ladles

# Casting 150-Ton Mill Housing

**The 150-ton steel casting shown in production stages on this and succeeding pages was cast at the Wheeling, W. Va., foundry of the Blaw-Knox Co. It is one of twin units which will form the mill stand for a new two-high combination four-high slabbing and plate mill that Blaw-Knox is building for a steel plant.**

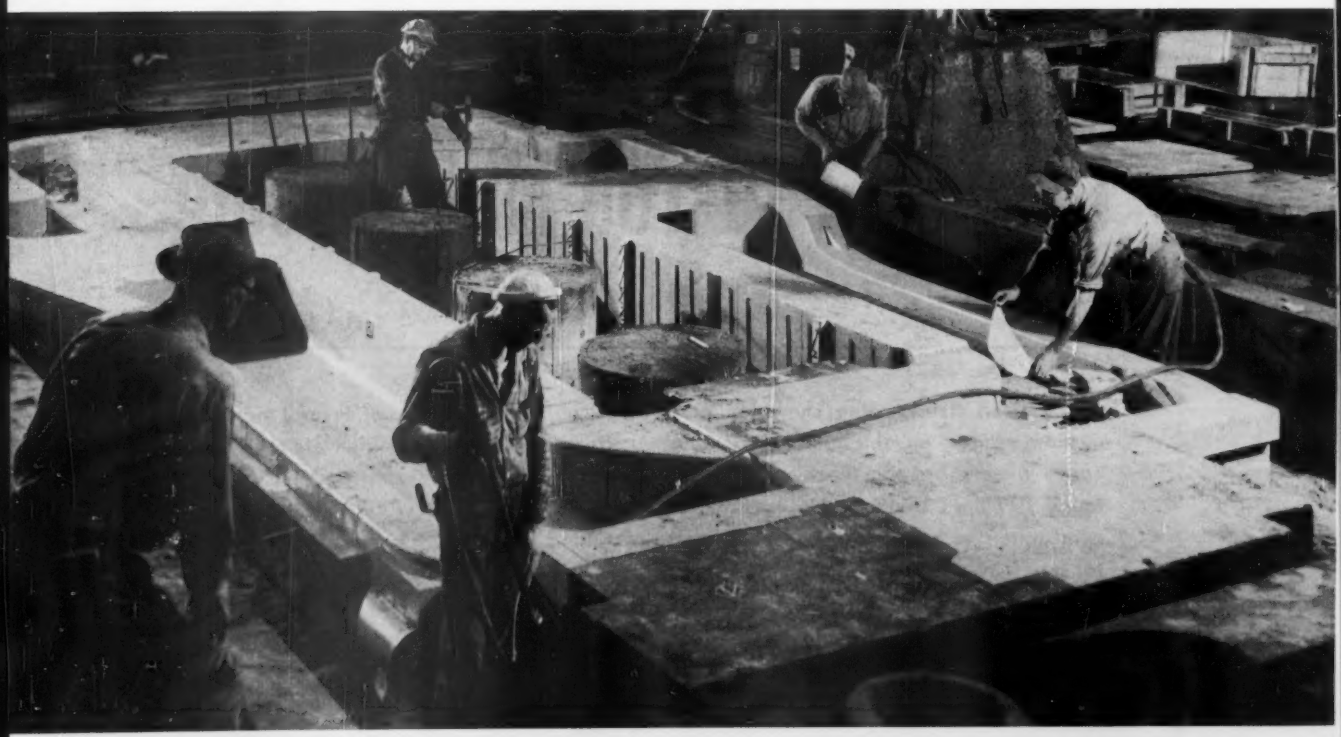
**The sequence of photographs represents an elapsed time of several months—from the time the patterns were ready until the casting was machined. Measuring 34 ft long and 17 ft wide, it is the biggest rolling mill housing ever cast at Wheeling Works. The foundry's open-hearth furnaces supplied 308,000 lb of molten steel for simultaneous pouring from three ladles.**

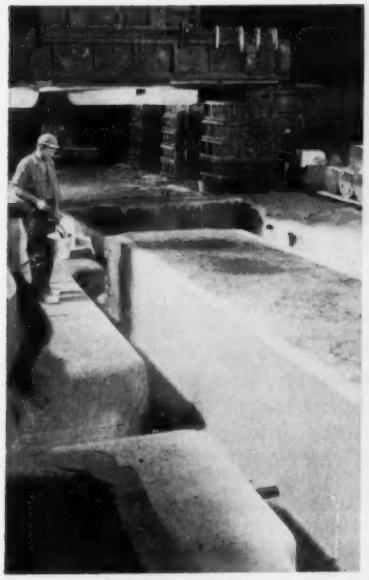
# Casting 150-Ton Mill Housing



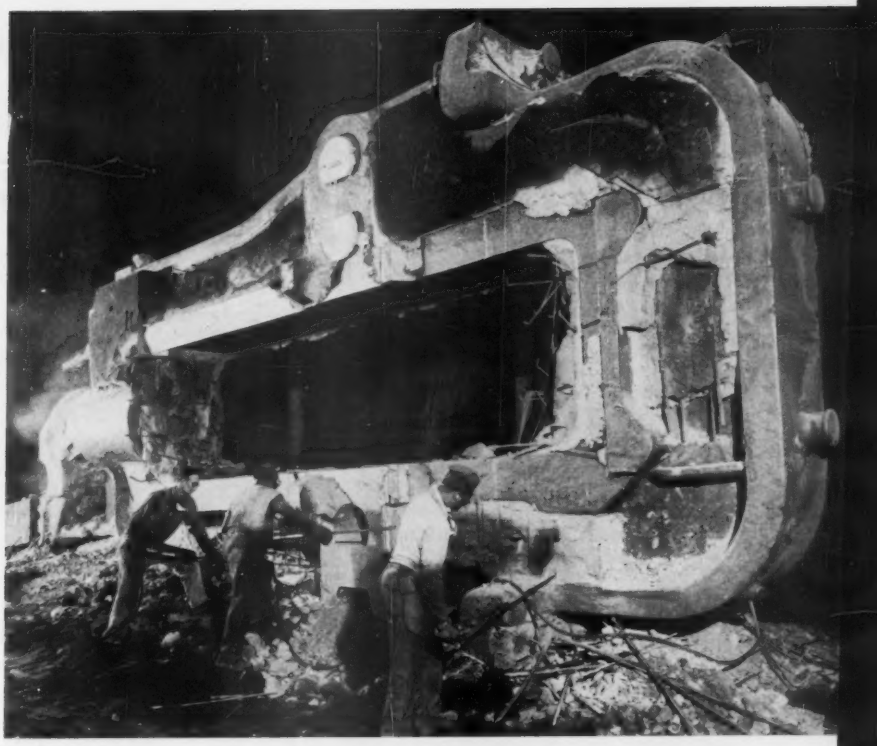
Putting the finishing touches to the wood pattern for the mill housing

Pattern has been set in pit and ramming of the mold is in progress



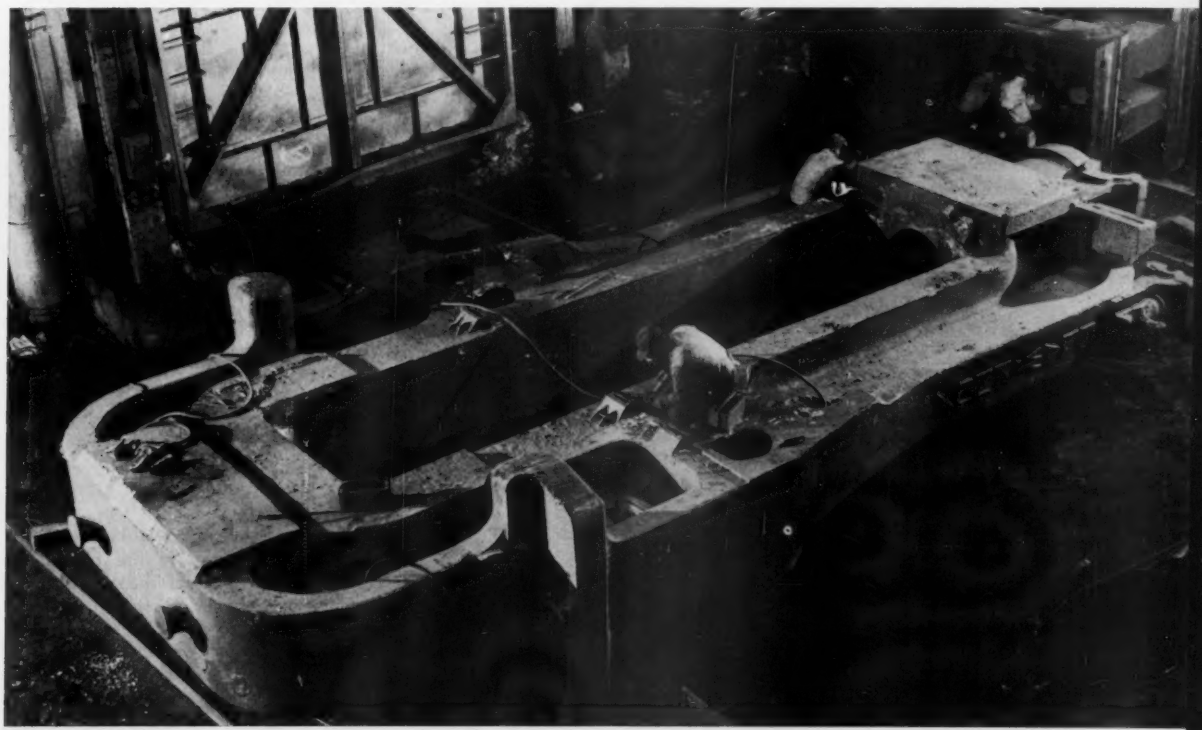


Spraying the drag section of the mold with wash. The cope section is shown in background



▲ Rough cleaning the casting on the flogging floor. Pneumatic hammers chip out the molding sand that was retained after casting shakeout

▼ Chippers clean up the surface of the huge 34-ft-long cast housing



# Quoting for Profit

***Techniques for determining proper casting design, production method, correct cost elements, and a satisfactory selling price are presented in this article. Utilized by personnel of Misco Precision Casting Co. for quoting on investment castings, the techniques are applicable to any foundry operation and any casting process in use in the industry***

## Introduction

By K. J. YONKER, *vice president, sales*

Information presented in the following study is typical of that used as a basis for quotations on investment cast parts and is intended to help the design engineer to determine suitability of the investment casting process to produce components of equipment he is designing.

The representative part discussed in this presentation and illustrated in Fig. 1 and 2 was cast at Misco Precision Casting Co., Whitehall, Mich. It is a gimbal casting for Emerson Electric Mfg. Co., and is used in the fire control system of the Convair B-58 bomber. Armco 17-4PH alloy was specified and was used primarily to obtain certain thermal expansion properties; other physical properties were of secondary importance.

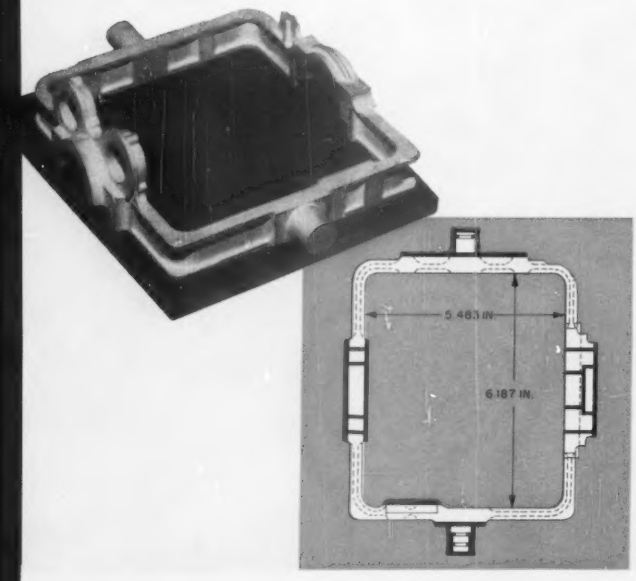



Fig. 1 and 2—Representative part discussed is gimbal casting (upper left) used in fire control system of Convair B-58 bomber. Dimensions on the sketch show size of part and the stock added for machining as indicated by shaded areas

## Engineering Review

By E. G. CHAPMAN, *chief engineer*

The analysis of any engineering drawing at time of quotation is extremely important. Failure of the engineering department to recognize tolerance ranges that are too tight can result in a company being saddled with parts that are impossible to produce at a profit except by selective inspection or by trying to secure subsequent engineering changes that will open tolerances. The engineering department must consider itself the watchdog of the company, since potential problems can result from failure to make a thorough preliminary blueprint analysis.

The engineering department is interested primarily in practicality of the part for the investment casting process. Design, size, general dimensioning and tolerances, and surface finish requirements are of principal importance.

General design of the part used here for illustrative purposes indicates many holes too small for practical casting, and other holes, if incorporated, would complicate die construction. Consequently, these holes were eliminated from the design used in quoting the customer. In addition, the trunnions would be used as a gating area, requiring solid metal at each section. The undercut sections of

This article is based on a panel discussion presented at the Investment Casting Institute's spring technical session June 23-25, 1958, in Muskegon, Mich.

the ribs and the general external configuration of the part were held as designed.

The specified tolerances on fractional dimensions were ±1/64 in., decimal dimensions ±0.005 in., and angles ±¼ degree. Internal dimensions of 6.187 in. and 5.483 in. carry a ±0.005-in. tolerance, and external dimensions 6 7/64 in. and 8 5/16 in. carry ±1/64 in.

Obviously, such tolerance ranges are impractical on a production basis. Also, addition of unnecessary finish stock for subsequent machining by the customer minimizes the value of investment casting. In view of this we decided to apply a general tolerance range of ±0.005 in. per in. on all dimensions except where machining stock was required. Typical wall thickness of 7/64 in. was acceptable. Outside corner radii were established at 0.031 in. Machining stock was added to the trunnions and adjacent faces, internal and external pads, major holes, and slotted sections, all of which require exceptionally close tolerances and very fine finishes. Shaded areas on the drawings show the areas where stock was added.

A casting drawing was made with the various changes incorporated and submitted to the customer with the quotation.

Production quality control required gaging of the casting to determine correctness of all basis dimensions and to determine that the casting is flat and square. Since all holes have finish stock added, it is unnecessary to check the diameters. A simple gage used to determine flatness and squareness is shown in Fig. 3 and 4. This gage is used in conjunction with the straightening operations and also serves as an acceptance gage.

## Process and Method Study

By N. LIRONES, *sales engineer*

When the casting design is established, the molding process to be used, type of tooling required, and gating technique are selected. This part and parts similar in design are well adapted to production in ceramic shell investment molds. These monolithic molds enable Misco to produce rather large investment castings of high quality and maximum physical properties at low cost. As-cast surface finish of 60 to 80 microinch rms with stable dimensional control can be realized in production quantities.

Tooling requirements for producing this casting with dimensional stability are important. The pattern die used for this part is illustrated in Fig 5. It was machined from aluminum and brass, the aluminum being in areas of large mass and of secondary importance, and the brass in areas that may require repairing or rework. This tooling enables Misco to inject the gimbal as a complete, dimensionally stable wax pattern without use of a loose insert or water soluble cores.

The die cost $3850 based on normal delivery time of nine to ten weeks. This is slightly higher than tooling using loose pieces or water soluble cores, but the difference is offset by time and cost saved at the wax injection operation.

We also analyze gating requirements thoroughly. Specialists prepare a number of sketches such as the one shown in Fig. 6. The one that will do the job best and also provide simplicity in wax assembly and cutoff operations, is chosen. Then the amount of wax and metal required to produce this part is calculated. This is done as shown by calculating the wax weights of the part, gates, runners, and riser. By multiplying the correct conversion factor, we obtain the metal weight.

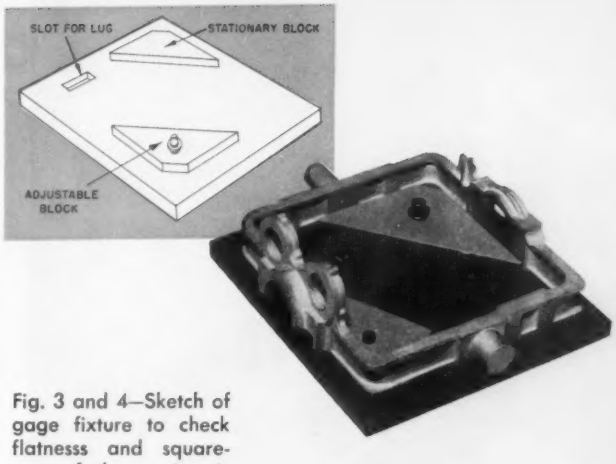



Fig. 3 and 4—Sketch of gage fixture to check flatnesss and squareness of the casting is shown at top. The finished gage with a casting placed for checking is illustrated at the right

## Metallurgical Examination

By B. PADDOCK, *quality control supervisor*

The blueprint for this part called for 17-4PH alloy of commercial composition with a copper content of 2.5 to 5.0 per cent. Metal of the following percentage analysis was used: 16.50 Cr, 3.30 Cu, 3.30 Ni, 0.60 Si, 0.40 Mn, 0.04 C, 0.023 N, less than 0.05 Cb, balance Fe. Inert gas atmosphere can be used in melting this alloy to maintain composition requirements. Melting was done in an electric arc rollover furnace.

The inquiry called for a heat treatment to Rockwell C32, using a solution treatment at 1925° for 1½ hr, oil quench followed by aging at 1250-1350° F for 3 to 4 hr, air cooled. Solution treatment was in a neutral atmosphere to reduce scaling. No physical tests were specified. The customer is interested mainly in a soft, easily machinable casting. Shipments require certification to composition and heat treatments.

## Nondestructive Testing

By S. H. DAVIS, *nondestructive testing supervisor*

X-ray requirements on this part included five separate exposures with six 14 x 17-in. films for every four castings x-rayed, four exposures at 250 kv and one exposure of two films at 1000 kv.

The following information also was needed to quote properly on the casting: How the part will be stressed and where the critical areas are situated. Is welding permissible; if so, where? Must film be serialized?

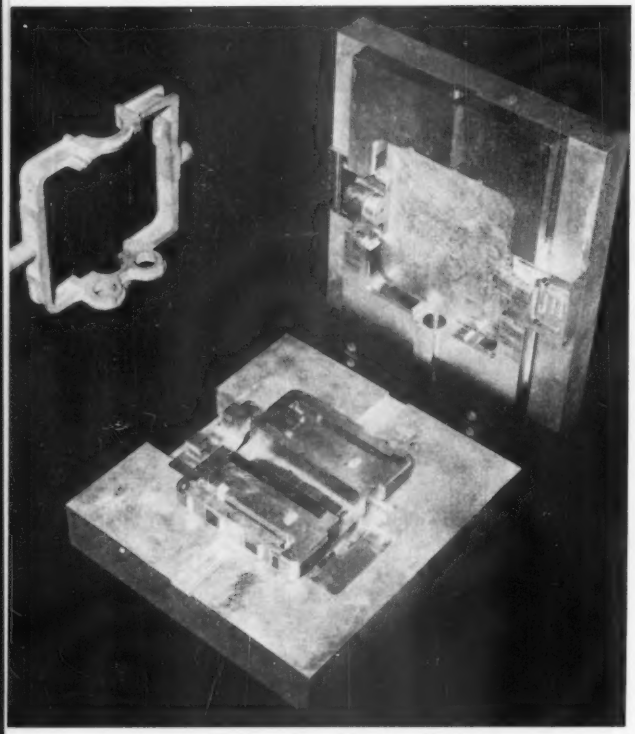


Fig. 5—Pattern die, requiring no loose inserts, makes a one-piece wax pattern, no cores needed

## Cost Analysis

By C. W. CRIBBS, *sales development engineer*

It is assumed that the part under consideration has been accepted for quoting on the basis of size, metallurgy, design, and desirability by sales, engineering, and metallurgical personnel. To prepare the cost sheet the alloy, pouring weight, cluster size, process (ceramic shell or investment), method of pouring, and tooling design must be considered.

Our cost sheet provides a detailed breakdown on operations, scrap levels, material, burden rates (variable cost), and fixed cost. The two sides of this sheet are shown in Fig. 7 and 8. Cost factors to be considered but which are not included in burden rates or covered by established standards are outlined below:

*Wax Injection*—Amount of wax to be injected, design of die, scrap levels.

*Wax Assembly*—Cluster size, time involved for gating. Will assembly fixtures be used? Bar dies?

*Melting and Pouring*—Type of equipment used (vacuum, air/arc, argon/arc, air/induction, argon/induction, shank, or rollover). Metal weight to be poured and type of alloy determines type of melting unit and atmosphere required.

*Cut-off*—Size of cluster, number of gates, difficulty in handling. Rates normally based on time required per sprue or cut.

*Rough Inspection*—Standard rate on all parts except specials. Rates on special parts, extra large and complex, are based on experience with similar parts.

*X-ray*—Cost based on per-film basis, by number of pieces per film, and the equipment used (250 or 1000 kva).

*Sprue Grind*—Standard time per sprue times number of sprues to be ground. This varies with size and location of sprue.

*Finishing*—Work with mounted points involves removal of excess metal or pits in areas not reached by abrasive belts. Belt grinding involves removal of excess metal and improvement of surface quality on areas not covered by mounted points. Rates are based on experience with similar parts.

*Gaging and Straightening*—Estimates are based on experience with type of gage required. Consult with engineer and gaging foreman.

*Heat Treat*—By hour/furnace load rate.

Scrap rates are affected by alloy cast, customer specification and quality requirements, and configuration of part. Each station's scrap rate is estimated on past experience with similar parts in the same alloy.

To obtain the total cost per piece including scrap as listed in the righthand column of figures in

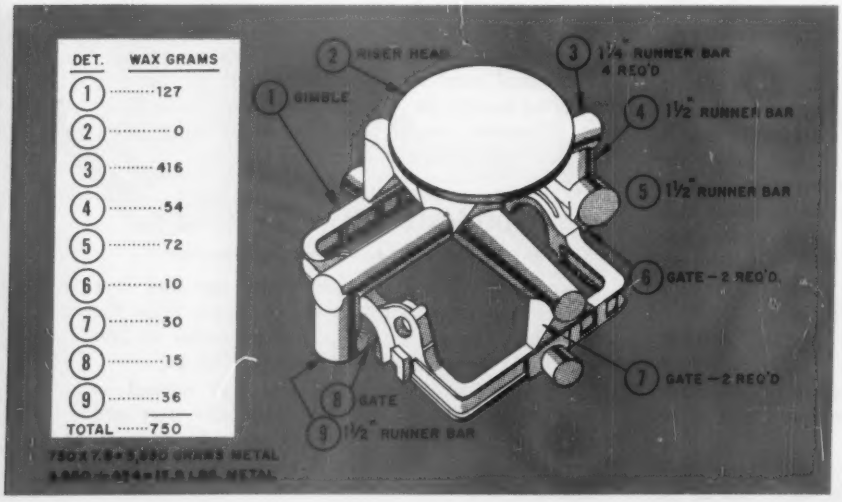



Fig. 6 — Gating requirements are determined by sketch as shown here and quantities of wax and metal needed to make the casting are calculated

Fig. 8, the accumulated labor-burden-fixed-cost total shown in the third column is multiplied by the scrap rate factor at the station. The factor used is the one on the same line in the cost sheet or the next factor down the column if a factor is not shown on the same line with the item in question.

The total of the last column is entered in the summary section on the front side of the cost sheet shown in Fig. 7. The metal cost calculation also is made on this side and is based on the total pouring weight in pounds per cluster times the basic metal price per pound.

Then the total weight of castings alone is subtracted from total weight of metal poured in the mold to determine weight of scrap including gates and risers. In this case only one casting is made in a mold.

Ninety per cent of scrap, mainly gates and risers, is recoverable. This weight times the scrap allowance price is deducted from the metal cost per cluster to give a net metal cost per cluster. This cost is divided by the number of pieces in a cluster (one in this case) to obtain cost per piece and the amount listed as metal cost in the summary at bottom left of the cost sheet.

Total wax weight required is obtained by dividing the metal weight by the wax-metal weight factor for the alloy used. In this case the factor is 7.8 for alloy 17-4PH. The metal weight is divided by 7.8 to obtain the wax weight in pounds. This total weight is divided by the number of pieces per cluster and that value multiplied by price per pound of wax to obtain the wax cost per piece. The resulting figure is entered in the wax column in the summary.

# Computing the Selling Price

By C. W. CRIBBS, *sales development engineer*

The labor-burden-fixed-cost total including scrap from Fig. 8 is entered on the front side of the cost sheet (Fig. 7) in the final calculation column of the summary.

Wax cost per part is multiplied by the scrap rate pertaining to investment or ceramic shell molds.

Investment cost is multiplied by the scrap rate at investing to arrive at total investment cost. In this case it is included in the burden.

Metal cost is multiplied by the scrap rate at casting for the total metal cost per part.

The labor-burden-fixed-cost, wax cost, investment cost, and metal cost are totaled to arrive at the total cost including scrap for the part.

From this cost is deducted the value for scrap castings from metal pouring to casting shipping. It is obtained by multiplying the scrap value per piece by the scrap factor.

The resultant figure is then marked up for profit to arrive at a selling price.

The selling price for the quantity to be purchased is determined by reference to a quantity pricing schedule shown in the summary section.

This method of cost estimating reflects an accurate cost factor. There are variable conditions, any one of which could affect actual performance once an order is received. By using such a detailed cost estimate sheet, we can anticipate many of these variables, or at least set a goal for obtaining an order to make the part at a profit.

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

Fig. 7, left, and 8, right, show front and back, respectively, of cost sheet used to record and compute cost data and to calculate a proper and fair selling price for the gimbal casting

**COST SHEET**

Date 2-20-58 — Job Make On No. —

Part Name GIMBAL — Part Number S71103-12

MATERIAL COST CALCULATION

Alloy 17-4-PH — Cluster Size 1K1 — Finished Wt. 2.19

| | Pouring Wt. | Cost/Lb. | Total Cost |
|---|---|---|---|
| Pouring Wt. 33.90 Grms. ÷ 454 = 14.90 Pour Wt. | 12.90 | .625 | 6.71 |
| Minus Total Ship. Wt. (Pcs./CLST × Fin. Wt.) = | 2.19 | | |
| Total Weight of Scrap | 9.71 | | |
| 90% Recovery of Scrap | 8.74 | .08 | .70 |
| Std. Metal Cost per Cluster | | | 6.07 |
| Std. Metal Cost per Casting (After Cut-off) | | | 6.07 |

WAX MATERIAL COST

| Wt. of Wax | ÷ 454 = Lbs./CLST | ÷ Pcs./CLST = | Lbs./Pc. | × Cost/Lb. = | Total | Scrap Factor | Total Cost With Scrap |
|---|---|---|---|---|---|---|---|
| 760 | 1.66 | 1 | 1.66 | .65 | 1.07 | | |

INVESTMENT COST — Flask Size Mono-Shell — Paper Height —

| Lbs. Per Flask | ÷ Pcs./CLST = | Lbs./Pc. | × Cost/Lb. = | Cost/Pc. | Scrap Factor | Cost/Pc. With Scrap |
|---|---|---|---|---|---|---|
| | | INCLUDED IN BURDEN | | | | |

| SUMMARY | Amount | Scrap Factor | Total w/Scrap |
|---|---|---|---|
| Labor & Burden | | | 41.79 |
| Wax Cost | 1.07 | .170 | 1.82 |
| Investment Cost | IN BURDEN | | |
| Metal Cost | 6.07 | .161 | 9.77 |
| | | | 53.38 |
| Less Scrap Allow. | .175 | .61 | .11 |
| | | | 53.27 |
| Add'l PROFIT +.90 | | | |
| Quoted PRICE | | | 59.19 |
| QUANTITIES 100% | | 10 | 116.38 |
| 75% | | 50 | 102.58 |
| 50% | | 100 | 88.79 |
| 25% | | 200 | 73.99 |
| Base | | 500+ | 59.19 |

SCRAP VALUE

| Pcs. Wt. × Scrap Value/Lb. = Scrap Value/Pc. | | |
|---|---|---|
| 2.19 | .08 | .175 |

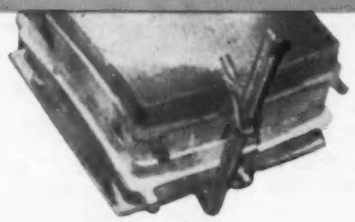
Value of Sprues, Risers, Etc.

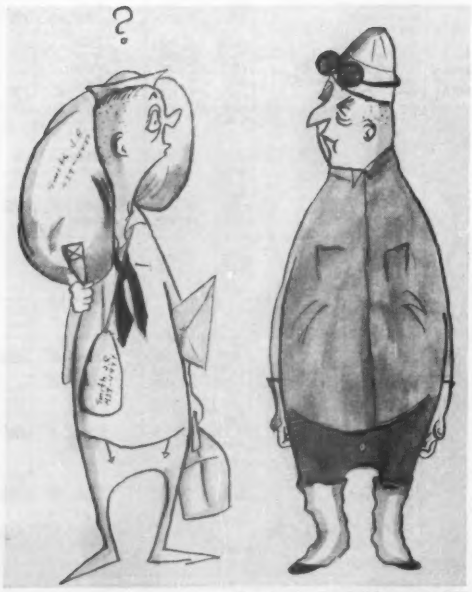
Scrap Rec'y Value ÷ Pcs./CLST = Total Value

| OPERATION | Oper. No. | Std. Hrs. | Labor Rate Inc. Var. F.C | Rate No. | Total /Pc. | Scrap Rate | Factor | Total/Pc. Incl. Scrap |
|---|---|---|---|---|---|---|---|---|
| Wax Inject/Plastic Patterns | | .100 | 5.00 | | .500 | | | .575 |
| Wax Inspection | | .020 | 9.00 | | .080 | 10 | 189 | .151 |
| Sub. Assy. | | | | | | | | |
| Bars & Cruc. | | .050 | 5.00 | | .250 | | | .525 |
| Wax Assy. | | 1.000 | 5.00 | | 5.000 | | 13 | 5.600 |
| Dip Cost Mono-Shell (2) | | .120 | 12.00 | | 1.440 | | | 1.469 |
| Line & Mount Mono-Shell (2) | | .150 | 12.50 | | 1.870 | | | 1.439 |
| Remove De-Wax | | .150 | 12.50 | | 1.875 | 5 | 170 | 1.638 |
| Cost | | .160 | 12.00 | | 1.880 | 2 | 161 | 1.037 |
| Knock Out | | .020 | 7.00 | | .140 | | | .221 |
| Case Blast | | | | | | | | |
| Bend Test | | | | | | | | |
| Cut Off/Salt Bath | | .100 | 8.00 | | .800 | | | 1.254 |
| Grind/Salt Bath | | Inc. | | | | | | |
| Rough Blast | | Inc. | | | | | | |
| Rough Insp. | | .020 | 4.00 | | .080 | 15 | 189 | .125 |
| Spr. Grind/Abrasive | | .080 | 8.00 | | .640 | | | 1.528 |
| Spr. Grind/X-Ray | | | | | | | | |
| Mtd. Points | | .180 | 6.00 | | 1.080 | | | 1.947 |
| Belt Id & Od | | .070 | 5.00 | | .350 | | | .969 |
| Mtd. Pts. | | | | | | | | |
| Platforms | | | | | | | | |
| Line Count | | | | | | | | |
| Ratio Process | | | | | | | | |
| Parting Line | | | | | | | | |
| Sand Blast | | Inc. | | | | | | |
| Final Insp. | | .040 | 4.00 | | .200 | 6 | 134 | .268 |
| 2nd Mtd. Points | | .060 | 5.00 | | .300 | | | .801 |
| 2nd Belts | | .020 | 5.00 | | .100 | | | .127 |
| 2nd Platforms | | | | | | | | |
| Parting Lines | | | | | | | | |
| Sand Blast | | Inc. | | | | | | |
| 2nd Final Insp. | | .040 | 4.00 | | .200 | 6 | 127 | .254 |
| Primary Stra. | | .100 | 5.50 | | .550 | | | .650 |
| Heat Treat | | | | | | | | |
| Sand Blast | | Inc. | | | | | | |
| Zyglo | | | | | | | | |
| 3rd Final Insp. | | .025 | 4.00 | | .100 | 10 | 120 | .120 |
| 2nd Gage | | | | | | | | |
| Sand Blast | | Inc. | | | | | | |
| X-Ray (W) 2.25/4x4 | | | | 2 | 2.250 | 2 | 108 | 2.430 |
| X-Ray (C) 2.50/2x2 | | | | 2 | 2.500 | 5 | 106 | 2.703 |
| Ship | | | | | | | | .110 |
| Total | | | | | | | | 41.785 |

A group of trainees at the Naval Molder School taps an electric, induction-type furnace

# Training Molders for the Navy's Floating





Drawing by Frank Schneeman, DC2

CHANCES are that as a tax-paying foundryman you have never been on a floating foundry or ever heard much about one. Primarily, a Navy molder's duty is a military one, but the smell of hot sand and the feel of a molding tool in his hands affect him just as they do any brother molder on land. The intangible attachment produced by creating castings with sand and molten metal inevitably seeps into his bones.

At the U. S. Naval Molder School, San Diego, Calif., we like to hope that the young sailor picks up some of this feeling in his formative weeks as a student. Along with the learning activities, a chance to acquire some characteristics of a typical molder is afforded in the 16-week Class "A" course for beginners.

One of the largest and finest U. S. Navy repair ships is the *U. S. S. Jason* (AR-8), shown here in the center foreground at a San Diego dock

# Foundries

By JAMES HURLBURT
U. S. Naval Station
San Diego, Calif.

**Training Molders**—The 16 weeks are broken up into six units of instruction. The first unit (two weeks) is spent entirely in the classroom, on such subjects as basic math, blueprint reading, administrative details, tools, equipment, and safety precautions. In the next five units, the majority of the time is spent in the shop after an early-morning classroom period. Along with these initial skirmishes with foundry problems, the developing Navy molder also fulfills such military functions as inspections, watches, saluting, and other duties.

**Coremaking**—During the second unit—two weeks of coremaking—the trainee is introduced to sand and its properties for the first time. Some insight into the nature and function of sand for coremaking uses is brought out as he mixes sand and makes cores in the shop, which is efficiently equipped.

A change from the comparative coolness of the coreroom to the melting and mixing of metals unit (four weeks) provides the young sailor's first encounter with molten metal. Under the watchful eye of an understanding chief or first-class petty officer, the wary novice learns the necessity of teamwork and safety in handling hot metal. Melting equipment in the shop includes two indirect-arc, three coreless induction, and three oil-fired furnaces which are used to melt aluminum, gray iron, Monel and Navy-type brasses and bronzes.

In addition to the practical work done in the shop, the trainee covers subjects which include calculating weights for a heat; maintenance, operation, and repair of the furnaces; some physical metallurgy; pouring temperature ranges; and safety precautions. The last week of the four in this unit is spent in the bearing shop, where he sets up and rebabbitts bearings. On completion of this unit, the student is at a halfway point in the course and is ready to go on to the molding phases of his instruction.

**Nonferrous Molding**—It may be difficult to imagine one of your oldtimers giving up his lunch-hour period for more time on the molding floor, but that's what happens when these youngsters get to the next four-week unit, molding for nonferrous metals. Evidently it's the "bug of the trade" biting, and to us Navy oldtimers this eagerness and spirit is rewarding.

The shop work and subjects completed during these four weeks are gating, risering, casting defects and their probable causes, simple and intricate molding projects, sand requirements and conditioning, and other, related topics. Moisture, green compression, clay content, and permeability tests are

made on sand in the sand test lab, topside in the shop, and a moisture test is conducted on the floor with a newly conditioned heap before molding.

Most of the work is done on the bench with snap flasks. Metals used are aluminum; "G," "H," and "M" in bronze; manganese bronze; naval brass; and admiralty metal. Some of the finished castings are sent to the recently established Naval Radiograph School on the base to be x-rayed for internal defects, which dramatize the need for proper practice in gating, risering and pouring, etc., when they are found.

The patterns used by our young molders are made by the patternmaker students, who attend school adjacent to the molder school. This combined patternmaker-molder school is the only one of its kind in the Navy and supplies the fleet with most of its competent shop men in both fields.

**Ferrous Molding**—After the four-week tussle with nonferrous molding, the trainee advances to molding for ferrous metals, a three-week unit, and the next-to-last. Some of the shop projects completed in this unit are flanged elbows, cored billets, handwheels, gear quadrants, pump housings, and test plates which are used by students at the nearby welding school. Subjects covered include progressive and directional solidification, temperature gradients, mold manipulation, mold pressures, characteristics of cast iron, synthetic sand and facings, and casting-weight calculations.

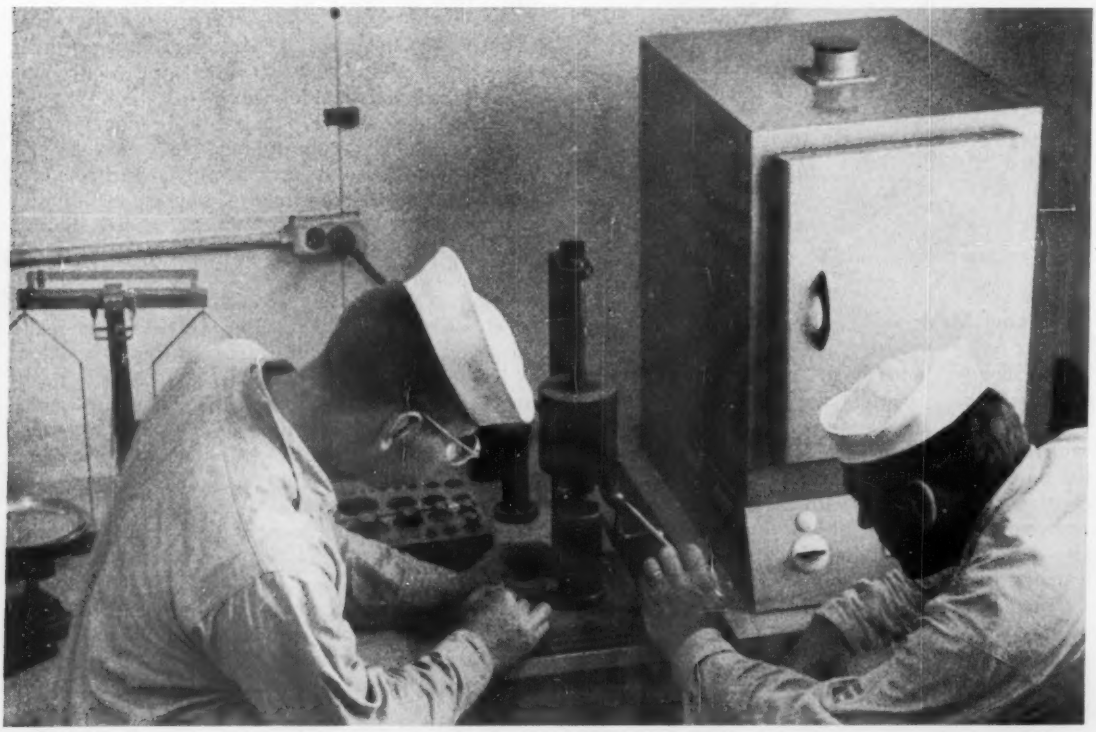
A critical point in the 16-week period is reached at this time and causes an undercurrent of excitement and anticipation. Each student is obliged to submit his choice of duty stations to the office. They are checked and sent on for consideration in making out the final orders for the prospective graduate molder. Until these final orders do come in, there is much speculation among the young sailors as to their new ship or port assignment, and the moving-on fever seeps in. This situation is relieved by the time they get into the last week, the foundry organization and administration unit of the course.

**Final Week**—In view of the fast-moving events and prevailing anxiety, the last week is a hectic one. Arrangements for traveling, plans for a stop at home, and curriculum obligations are dealt with in these last few days. Some of the shipboard procedure and routine that may be encountered in their new, seagoing status is introduced in the classroom sessions of this final week, and in the shop he has to fulfill a final project test that taxes the knowledge he has gained in his weeks at the school.

The instructor hands the student a pattern and tells him the metal to be used, leaving the gating, risering, pouring temperature, coresetting procedure, and weight problem fully to his own discretion. When completed, the finished casting is graded by three instructors and the mark entered in the student's file. A final written exam is given on Thursday and is considered with previous grades.

Friday is graduation day, and by Friday evening the young sailor is on his way to a ship. If in a few years he attains petty officer status, as is probable, he may return to attend the Class "B" advanced molder school.

**Course work for students at the school includes performance of moisture, green compression, clay content, and permeability tests in the sand lab**



**Advanced School**—The curriculum at this school includes $CO_2$ molding and coremaking, vapor degassing, shell molding, centrifugal molding, and more complex molding and melting problems, geared to keep the shipboard molder in closer touch with the ever changing developments and progress of the trade. This is a ten-week course of instruction and is of much value to the higher enlisted rates of the fleet.

**Shipboard Operations**—To return to our own graduate molder, let's assume that he has been assigned to a repair ship, such as the *U.S.S. Jason* (AR-8), one of our fleet's largest and finest.

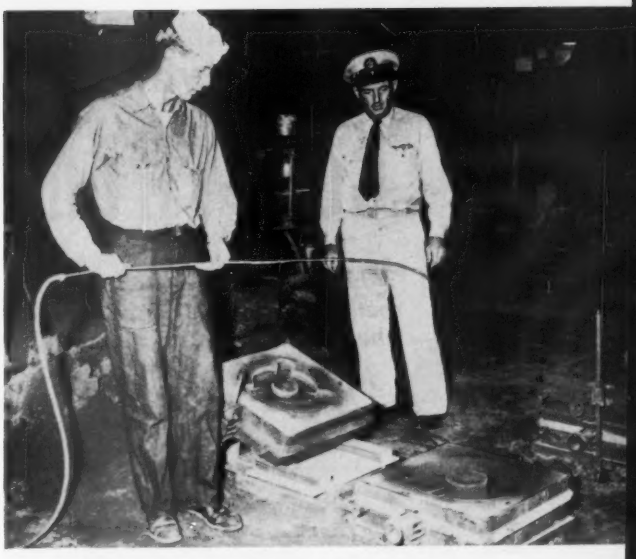
"Boss" of the shop is the repair officer. He must sift the hundreds of work requests that come across his desk from ships needing repairs and must coordinate the resulting workload necessary to complete these orders in the specified time.

On the *U.S.S. Jason,* the shop is two decks below the repair office and a bit aft. It is laid out so that it encompasses three deck levels of the ship. From top to bottom these levels are termed upper foundry, lower foundry, and stowage spaces.

The upper foundry is where the coremaking activities take place. Two electric core ovens, core sand bins, core benches, and a sand mixer comprise the coremaking equipment, plus locker-living spaces for the foundry crew, a recordkeeping desk for the petty officer in charge, and other items. A complete network of blowers throughout the shop draws off gas and smoke and provides a fresh air return.

The main center of operations is the lower foundry. Higher overhead space affords better working conditions and the use of heavier equipment. Molding, sand conditioning, pouring, and finishing of castings are done on this level. Three indirect-arc furnaces melt brasses, bronzes, cast iron, steel, and Monel. A U. S. Navy type electric furnace melts aluminum and other lower temperature metals. These furnaces are stationed around the spacious molding floor, where natural-bonded and Navy all-purpose (synthetic) sand are heaped for easy access. A muller and gyratory-type riddles handle the sand conditioning. Finishing equipment includes a cabinet-type sandblast, a sprue bandsaw, and a floor grinder. A 3360-lb capacity overhead crane runs along an overhead track and is used to lift metal and heavy items from the stowage space level as well as for other work in the shop.

The stowage space is what you would call your backyard, but instead of being "back," it is below. Thus, we have an advantage over you when it rains. Neatly stowed in our "backyard below" are the metal, new sand, spare machinery parts, and other miscellany. An extensive stock of cast billets is stacked securely in a bin along the starboard side. During emergency rush periods, especially overseas, this stock of billets is a timesaver in allowing more casting time for the decisive work at hand. When a foundry may have to "shove off" for distant lands, replacement parts for the furnaces and machinery, molding materials, crucibles and refractories, and many other items have to be stocked for any eventuality that may arise. This problem is one for the petty officer in charge to take care of at the time that the ship is in port.



In the school's foundry, practical instruction is given by experienced Naval personnel

**Big Job**—Of the job orders completed on the *U. S. S. Jason,* one stands out as especially worthy of mention. During the Korean conflict, the *U.S.S. Guadelupe,* a Navy oiler, was in trouble and needed a gray iron casting that would weigh 1000 lb. For a shipboard foundry, this casting was quite a challenge. The *Jason* molders successfully completed the job and enabled the oiler to operate efficiently in the area without having to return to the States. This casting was the unchallenged record for a shipboard casting made by any of the United Nations forces in operation at that time.

Another job that gave the patternmakers a battle, along with the molders, was a bronze fire and flushing pump housing that weighed over 500 lb when completed. A great number of other, smaller jobs was completed for all types of ships, including the *U.S.S. Missouri.*

So it has been with our Navy molders for more than 30 years. Along with their devotion to duty, they have met the challenge of emergencies and the complexities of ship repair molding and have played an important role in maintaining the fighting efficiency of the forces afloat. As battleship, repair ship, and shore-based sailors, they manned general quarters stations during the bombardment of Pearl Harbor. Some went down with the *U.S.S. Arizona,* and others took part in the rescue-salvage operations that began soon after the attack.

Because of changes in design, molders have been removed from the complements of first-line fighting ships and have been assigned to repair-type activities, making them a still vital supporting force in this work that enables our battle fleets to remain in advanced areas.

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

## *Use of Oxygen in the*

# Coal-Fired Air Furnace

***Advantages include reduced coal consumption, increased melting rate, better control of the metal bath temperature, reduced oxidation of the readily oxidized elements, and improved slag and metal fluidity***

By J. B. LAPOTA
National Cylinder Gas Div.
Chemetron Corp., Chicago

THE use of oxygen for refining electric furnace steel and other metals is a well established process in the foundry industry. In the malleable iron foundry, oxygen also has been found to have definite possibilities as an operating tool in air furnace operation.

**Process Advantages**—The use of oxygen to improve combustion of the pulverized coal fuel in an air furnace offers the following advantages over normal furnace practice:

1. It reduces fuel consumption.
2. It increases melting rate.
3. It provides better control of metal bath temperature.
4. Through shorter heat time, it reduces the amount of oxidation of readily oxidized elements.
5. It improves slag and metal fluidity.

**Combustion in the Air Furnace**—In the oxidation of pulverized coal with atmospheric air, a number of successive reactions take place. First, each spherical coal particle is enveloped by enough air, containing approximately 21 per cent oxygen, to carry out combustion. As the particle absorbs heat, it becomes ignited and in turn transfers heat to the surroundings by radiation. If the oxygen content of the air is increased, more oxygen becomes available to each coal particle, and the rate of combustion is accelerated.

For example, by enriching the air to 24 per cent oxygen instead of the normal 21 per cent, more heat is constantly produced and ignition of the coal particles is more rapid. This causes increased radiation of heat to the charge and to the furnace walls. Thus, the addition of oxygen accelerates the heating process.

**Flame Enrichment**—As usually practiced, flame enrichment is started shortly after firing has begun and is continued throughout the melting period until the metal charge is melted flat in the furnace. Usually, after the pieces have been melted flat, coal input is increased proportionally to reduce the available free oxygen, thus preventing excessive oxidation of the iron and other oxidizable elements in the charge.

Experience has shown that the melting rate can be accelerated as much as 10 per cent as a result of more efficient combustion and heat transfer due to oxygen enrichment.

**Injection Procedure**—When this practice was first developed, oxygen was injected into the furnace proper through a water-cooled lance. However, the results of more recent practice indicate that injection of oxygen directly into the stream of the pulverized coal-air mixture at the burner is more efficient and economical. This injection system, with the oxygen lance mounted coaxially in the center of the burner is illustrated in Fig. 1. The center-injection technique assures an intimate mixing of oxygen-enriched air and pulverized coal.

**Duplexing Operations**—In addition to improving combustion efficiency in furnaces charged with cold metal, this oxygen-enrichment process also has proved its worth in duplexing operations. In duplexing operations, oxygen is a valuable tool for improving control of metal temperature and chemistry. If desired, oxygen may be used in the cupola as described in "Oxygen Injection Process Aids Cupola Combustion Controls," FOUNDRY, May, 1958.

**Controlling Metal Chemistry**—One of the more time-consuming operations in conventional air furnace practice is the adjustment of metal bath com-

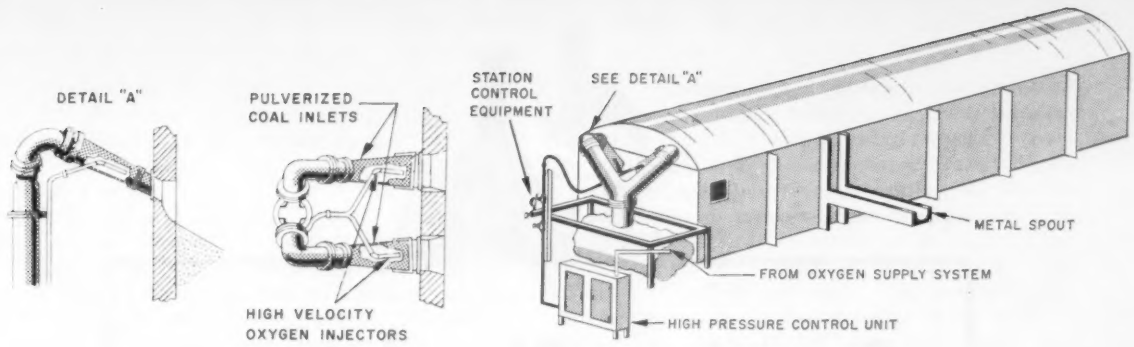



**Fig. 1—Injection of oxygen directly into stream of pulverized coal-air mixture at the burner, as illustrated here, aids efficiency and economy**

position to conform with the desired final analysis of the iron. After completion of meltdown, a metal sample generally is taken to check the analysis. If analysis shows the manganese, silicon, and carbon content to be too high, an oxidizing condition is maintained in the furnace until the proper analysis is obtained.

Iron ore sometimes is added to the bath at this time to speed the removal of silicon and manganese. Or, if the required adjustment is small, steel scrap may be added to the bath to lower the percentage composition of these elements by dilution. Both of these procedures are time-consuming and generally produce inconsistent results because of the lack of control over the reaction.

The use of oxygen instead of iron ore as the oxidizer provides more positive control over the removal of these residual elements from the bath. If the content of silicon, manganese, or carbon is greater than that desired, high-purity oxygen can be used to oxidize these elements. The oxygen is injected into the bath at the slag-metal interface, using an iron or steel lance pipe. This injection is carried out at specifically determined periods during the melting or refining cycle.

The reaction in the metal bath is quicker when oxygen is used. Further, more positive control of this reaction is possible because the silicon and carbon can be selectively oxidized. In addition, the exothermic reactions with oxygen add heat to the bath, in contrast to the cooling effect of iron ore or cold metal additions. These exothermic reactions also provide savings in heat time and fuel.

**How To Use Oxygen**—The equipment necessary to use oxygen in the air furnace is relatively inexpensive and simple to install. Only the following equipment, illustrated in Fig. 2 is required: 1. A high-pressure control unit. 2. A 1-in. throttle valve. 3. A 1-in. quick acting valve. 4. A 0-100 psi line pressure gage. 5. Piping from the oxygen source to the furnace.

Oxygen should be piped to the furnace burners from an adequate source of supply, such as a trailer or portable banks. The same bulk source can provide oxygen for other shop operations requiring oxygen. The station control equipment shown in Fig. 2 will simplify oxygen control during furnace operation.

The high-pressure control unit includes a 10,000 cfh capacity regulator, a high pressure valve, a surge tank, a relief valve, and appropriate gases. This unit reduces oxygen supply pressure to the desired line pressure and should be located adjacent to the oxygen supply source. Any pressure-reducing system can be used as long as it is capable of passing a minimum of 10,000 cfh when the inlet pressure is 400 psig.

It should be mentioned that the pipe size will depend on the length of the line and other factors concerned with the physical layout of the melting shop.

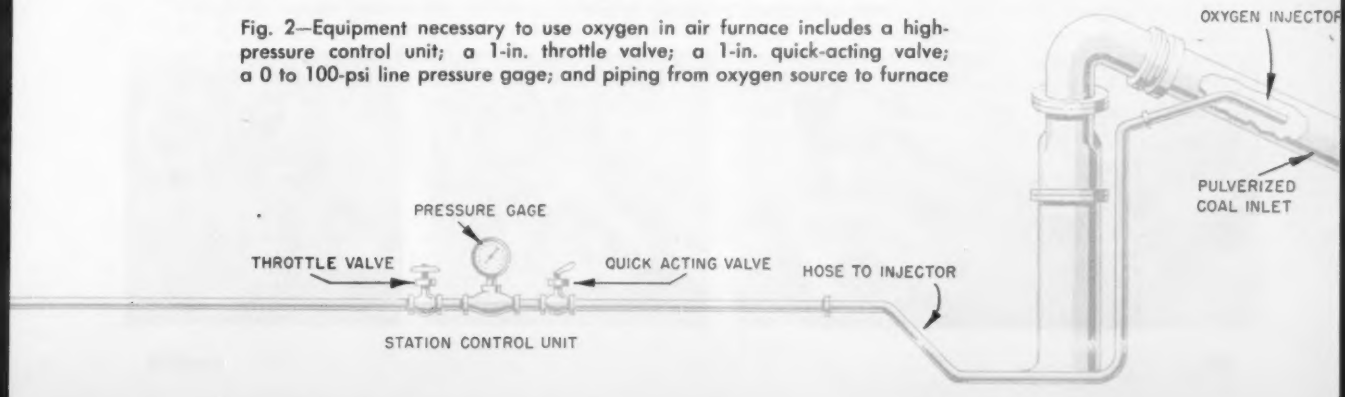
In addition to the oxygen supply equipment listed above, oxygen injectors also are required.

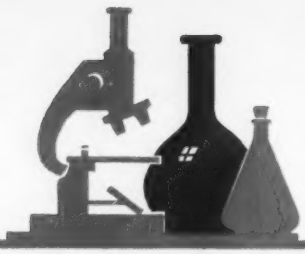
Although the same source of supply and the same high-pressure control unit may be used both for fuel enrichment and for oxidation of residual elements, separate station control units and branch supply lines should be installed for each purpose so that each process can be controlled independently.

---

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

**Fig. 2—Equipment necessary to use oxygen in air furnace includes a high-pressure control unit; a 1-in. throttle valve; a 1-in. quick-acting valve; a 0 to 100-psi line pressure gage; and piping from oxygen source to furnace**





# Gray Iron Chemistry

## *How It Affects Casting Quality*

***Operating supervisors, as well as metallurgists, should be familiar with the effects of different metal compositions. This knowledge can markedly influence quality of castings***

By FRANK L. ARNOLD
*Metallurgist*
Carver Foundry Inc., Fairview Village, Pa.

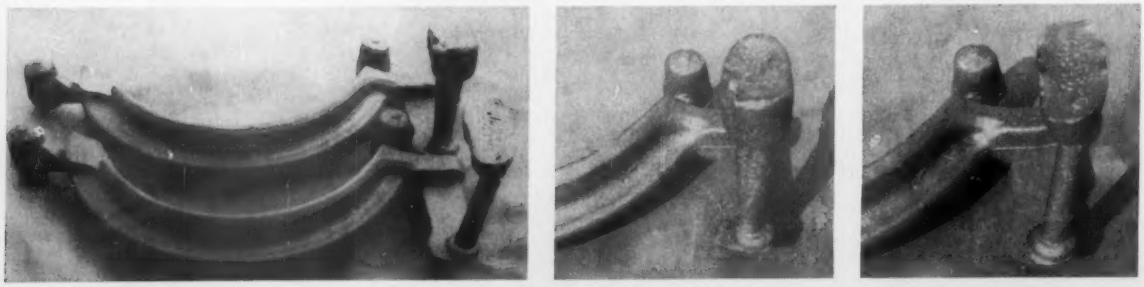
AN UNDERSTANDING of basic gray iron metallurgy is useful not only to the metallurgist responsible for physical and chemical quality control. Operating supervisors should find it equally useful in diagnosing causes of many run-of-the-heat scrap castings.

Some of the most common of casting defects—shrinkage, hot tearing, and even misruns—may be caused by wrong metal analysis for the application. Of course, responsibility for castings lost due to hard, unmachinable surfaces or its opposite, open grain, immediately is chalked up to metal problems, provided pouring temperature and cooling rate for the section involved were correct.

While it is generally recognized that poor metal can cause certain defects, it has been the writer's observation that often—especially in small jobbing foundries—there is insufficient understanding of the metallurgy involved and how to control this cause. Molders usually are the strongest advocates of metal control, blaming much of their scrap on "bad iron." It is the job of the man responsible for control of casting defects to determine just when to point the finger at metal chemistry and when to look elsewhere.

**Carbon and Silicon**—Unfortunately, in attempting to pinpoint casting defects caused by improper metal, no one set of rules can be laid down. One

Fig. 1—How carbon equivalent affects shrinkage when using pattern with set gating system. Using iron of 4.38 carbon equivalent, critical area of casting shown in center below was sound. Iron of 4.03 carbon equivalent developed a shrink in critical area of the casting shown at right



cannot glance at the analysis of cupola metal and say this element is too low or that too high without a knowledge of the metallurgical effect which each element has on the structure of the total gray iron alloy.

Commercial gray cast iron basically is a ternary alloy of iron, carbon, and silicon. Therefore, carbon and silicon are the two most important elements since variations in them will most drastically affect the characteristics and properties of the alloy.

Higher carbon and silicon contents tend to give a soft, gray, graphitic structure. Conversely, lower percentages of carbon and silicon increase the amount of the hard iron carbide constituent. The most important metallurgical product in gray iron is graphite, the very soft, low-density product of the decomposition of iron carbide. The total amount of graphitic carbon and its physical structure determine to a great extent not only the physical properties of the metal but also its behavior in the mold.

When a hypoeutectic iron of a certain carbon content is cooled from the molten state, the relative proportions of combined and graphitic carbon formed are dependent on the cooling rate and the amount of silicon present. Slowing the cooling rate and increasing the silicon content have the same general effect—namely, to render the iron carbide formed at the eutectic and eutectoid reactions unstable so that decomposition to graphite and iron takes place. Therefore, in an iron of given carbon and with given cooling rate the properties of the metal may be sensitively controlled by adjustment of silicon.

**Carbon Equivalent**—Just as high silicon will tend toward the more complete graphitization of an iron of a particular carbon, so will an iron of higher carbon graphitize more readily than one of lower carbon for a given silicon content. A formula which relates both carbon and silicon in a single factor is commonly called the "carbon equivalent." It is expressed:

$$CE = \% C + \frac{1}{3} (\% Si)$$

or, adjusted to the effect of phosphorus:

$$CE = \% C + \frac{1}{3} (\% Si + \% P)$$

This value actually shows how the eutectic carbon composition of the iron carbon system is lowered by silicon and phosphorus so that an alloy with a carbon equivalent of 4.3 is eutectic even though its total carbon might be somewhat lower than this. Similarly, alloys of higher carbon equivalent will act as hypereutectic.

The carbon equivalent of a metal, insofar as it shows the closeness of the alloy to eutectic composition and the graphite forming potential, is valuable in an understanding of chemistry and casting defects, as we shall see. The formula for carbon equivalent may also be used to adjust silicon to a different carbon content without greatly affecting structure or hardness.

**Sulfur and Manganese**—Sulfur in cast irons is a powerful carbide stabilizer and tends to inhibit the formation of graphite. It is usually considered that each 0.01 per cent sulfur is sufficient to neutralize the graphitizing influence of 0.15 per cent silicon. However, when sufficient manganese is present in the metal, sulfur up to about 0.14 per cent—the maximum allowed in most specifications—is not harmful. If the manganese content of the iron is at least three times the sulfur, all the sulfur combines to form manganese sulfide, a light inclusion which floats to the top of the liquid. The manganese content in commercial gray irons is between 0.40 to 0.90 per cent. The amount above that necessary to neutralize sulfur seems to have little effect on mechanical properties within this range.

**Phosphorus**—This element in ordinary gray iron acts metallurgically similar to sulfur as it is also a strong stabilizer of iron carbide and therefore tends to produce a deeper chill, especially when present in large amounts. It also forms a phosphide eutectic called steadite which has a relatively low melting point. It formerly was believed that phosphorus markedly promoted fluidity of molten iron, but recent work indicates that carbon is much more important in this respect. Because of the tendency of phosphorus to make iron more prone to internal shrinkage and also decrease machinability, many specifications limit it to 0.20 per cent maximum.

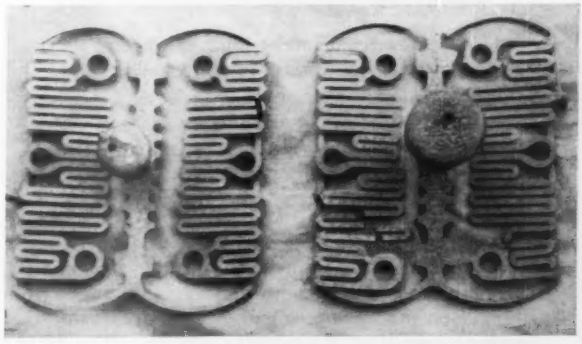


Fig. 2—Castings of suitable metal composition (left) separated easily from ingates. Before the composition was changed the castings were so brittle they broke (right) when an attempt was made to knock them off the ingates

**Shrinkage Defects**—A large number of factors can cause shrinkage in gray iron castings, and metal chemistry is only one of them. An iron metallurgically unsuited to a particular casting application may, with a special gating system and close control of pouring conditions, produce a sound casting. Conversely, a suitable metal when used with a hopelessly inadequate gating system can produce shrinks every time.

Hypoeutectic cast irons begin to freeze by the solidification of austenite dendrites. This condition leaves a network of liquid between the dendrites and a liquid-to-solid shrinkage which must be compensated for. At the eutectic temperature range, solidification of eutectic liquid takes place, resulting in an expansion because of the low-density graphite

Fig. 3—Silicon content commonly is adjusted by ladle additions of ferrosilicon

phase formed. The degree to which the metal will be "self-feeding," depends on the amount of graphite formed. Quantity of graphite in turn depends in part on the composition of the iron. All other conditions held constant, graphitization depends on the total carbon content and the ability of the other elements in the composition to decompose the carbide formed at the eutectic reaction. The factor which best expresses this is carbon equivalent. Higher carbon equivalent irons are more readily graphitized than those with low carbon equivalents.

Aside from its relation to the graphitization of iron, another important correlation of carbon equivalent to casting shrinkage is that it expresses the nearness of an iron to eutectic composition. The word "eutectic" comes from a Greek word meaning "easily melted." The advantage of an alloy of eutectic composition, evidently known to the Greeks, is that the difficult-to-feed "mushy" stage is eliminated.

The combination of these two facts generally results in a lower carbon equivalent iron being more critical with respect to shrinkage than the softer irons nearer to eutectic composition.

Recently our foundry was faced with a mysterious type of shrinkage in a semiproduction squeezer job. The casting was a fairly chunky brake shoe molded with a matchplate pattern having a set gating system. Although this casting had been made fairly often in recent years with very low rejections, shrinkage suddenly appeared in an embarrassingly large percentage of the castings.

Investigation showed that the castings were poured at a time when considerable steel was being used in the cupola charge. Chemical analysis of one of the bad castings was found to be 3.39 TC, 1.80 Si, 0.45 Mn, 0.083 S, and 0.220 P. Carbon equivalent of this metal is 4.06. More molds were made and poured with our usual metal with a ladle addition of ferrosilicon. Chemical analysis of this metal was 3.47 TC, 2.47 Si, 0.46 Mn, 0.088 S, and 0.261 P. Carbon equivalent is 4.38. This time no trace of the shrinkage was found. The two castings with the gating system are shown in Fig. 1.

Probably a better system of gating and risering for this pattern could have overcome shrinkage caused by changes in metal analysis. But the gray iron foundryman concerned with producing consistently good castings must be familiar with every variable connected with their production.

**Internal Porosity**—When metal chemistry contributes to microporosity, the element mostly to blame is phosphorus. The phosphide eutectic, mentioned previously under the discussion of phosphorus, has a freezing point 300° F lower than the graphite-austenite eutectic and thus exists as a liquid film around the cells during the freezing of this eutectic. It has been indicated that the phosphide eutectic liquid contracts during cooling and also during solidification. Since high-phosphorus irons solidify with a large number of eutectic cells, there is a tendency for microporosity dispersed in the casting.

Chemically, the best protection the foundryman has from microporosity is to produce low phosphorus iron. Wallace and Evans suggest that this element be kept below 0.10 per cent.[1]

Prevention of microporosity also is favored by the higher carbon equivalent irons having less mushy solidification.

**Hot Tearing**—Metal composition is an important factor in preventing occurrence of this defect, although it is by no means the only major cause. Here again we want to use a metal with low linear shrinkage and we have seen how the higher carbon equivalent irons have the lower solidification contraction.

Since hot tearing usually occurs during the cooling process, the hot strength of the metal becomes important. Manganese above that required to combine with sulfur is potent in increasing hot strength of cast iron and thereby making it more resistant to hot tearing.

**Avoiding Hard Iron**—A common problem of jobbing foundries pouring in the same heat castings with section thicknesses varying from ⅛ to 2 in. or more, is that of avoiding hard surfaces or even white iron in the thin sections and keeping a reasonably "close" structure in the heavy sections. Fortunately, all does not depend on metal chemistry; chills often can be used in the heavy sections to provide sound metal while the analysis is such that the metal is still gray even in the thin sections. Where tonnage melted in one heat is low and work on the floor is diversified, it has been the writer's practice to adjust the carbon equivalent of the cupola metal so that it may be used as tapped on most of the medium and large work. The analysis of the very thin sections is adjusted by ladle additions of ferrosilicon.

For example, consider our experience with a very thin grid casting mounted on a board for a snap flask. A few trial molds were made and poured with our regular iron which would produce satisfactory surfaces on the normal run of squeezer work. However, in this particular job the iron solidified so rapidly that the structure was completely white. The resulting castings were so brittle that they shattered when an attempt was made to break them from their gates. Fig. 2, right, shows such a broken casting.

To counteract the very rapid cooling rate it was decided that a very soft hypereutectic iron would be needed, similar to that used in the casting of piston rings. The castings do not have to be machined so the main problem was breakage.

The amount of ferrosilicon to bring the total silicon to about 2.6 per cent was mixed thoroughly in the ladle, as shown in Fig. 3. The resultant metal had a carbon equivalent well over eutectic and the castings were gray and soft and were easily removed from the gates. The result is seen in Fig. 2, left.

The difference in the metals can be readily seen by the fracture shown in Fig. 4. The white fracture is the iron which solidified as iron carbide and the gray is that which contained enough silicon to promote graphitization even at the fast cooling rate involved.

The above was an extreme case. Encountered more often are chilled surfaces which are too hard to machine due to the presence of combined carbon rather than graphite. Here again we are concerned especially with the influence of carbon and silicon on cast structure. The work of Schuz and Pohl has shown that chill depth is decreased rapidly by increasing carbon content for a given silicon or increasing silicon content at a given carbon. The chill test is a simple tool used by many foundries as a control over the chilling tendencies of their metal. In this test iron is poured into a chill block or wedge which is subsequently split. The depth of white iron gives an indication of the relative chilling tendency of the metal.

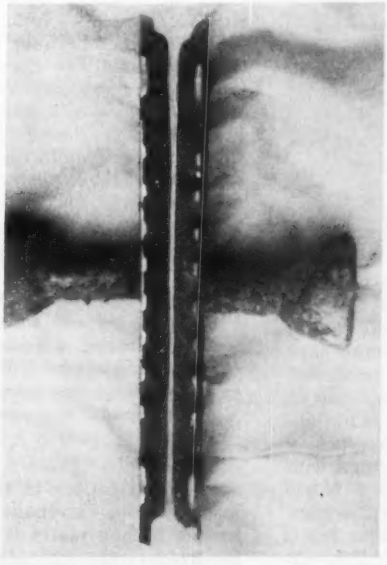


Fig. 4—Runner at left shows white ingates with carbon equivalent too low for section size. Gates at the right are gray; composition in this instance was hypereutectic

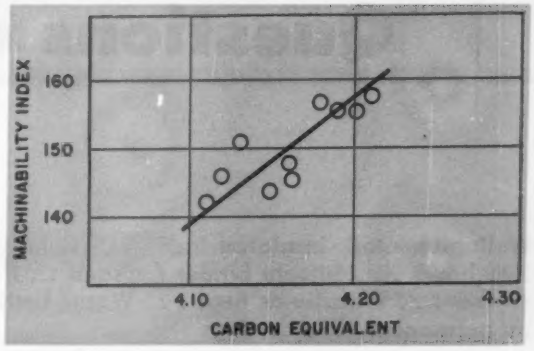



Fig. 5—Effect of carbon equivalent on gray iron machinability (Loria, Boulger, and Shaw[2])

The effect of carbon equivalent on machinability is shown in Fig. 5. As expected, higher carbon equivalent results in increased ease of machining. Loria, Boulger, and Shaw[2] have shown that increased amounts of manganese and phosphorus appear to have a slightly harmful effect on the machinability rating.

**Control of Fluidity**—Iron lacking enough fluidity commonly results in misruns and cold shuts. Faulty metal composition is a likely cause, although, as with other defects, there are many other considerations. In making up an iron with good fluidity properties, the foundryman is concerned with those elements which affect the eutectic point of the iron-carbon alloy. As we have seen before, the formula for carbon equivalent gives an approximation of the nearness of a gray iron to eutectic composition where fluidity is highest. For example, an iron with 3.40 TC, 2.30 Si, and 0.35 P has a calculated carbon equivalent of 4.2, which is just under eutectic and therefore this iron should have fairly high fluidity.

High-phosphorus contents give increased fluidity but this element has only a portion of the effectiveness of carbon and silicon in this respect.

**Summary**—The foundry really interested in controlling metal chemistry to produce good castings must carefully make up the metal charge, control the melting operation, and decide when to use ladle additions. Thus iron can be made with properties that will mean sound castings in the foundry and satisfaction to the customer.

REFERENCES

1. J. F. Wallace and E. B. Evans, "Risering of Gray Iron Castings," AFS Gray Iron Division Research Report, 1958.
2. E. A. Loria, F. W. Boulger, H. L. Shaw, "What Constituents Affect Machinability of Gray Irons?," *American Machinist*, Oct. 27, 1952.

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51

# Questions and Answers

**Well preheated, insulated ladle will hold steel for around two hours . . . Silicate binder for sand . . . Adds arsenic to copper . . . Withstands heat . . . Wants better surface finish on permanent mold castings**

## Use Insulated Holding Ladle

**The size of the steel castings which we can produce is limited by the capacity of our electric furnace. Can you tell us if it is practical to employ a gas-fired holding furnace to maintain approximately 5 tons of carbon steel in a suitable condition for as long as two hours? If so, would you kindly advise where we may obtain information concerning the construction of such a furnace.**

The use of a flame, whose combustion is supported by unpreheated air, to melt low and medium carbon steels has never been satisfactory. The reason is that the temperature of such a flame is very little above the melting points of such steels. Although the furnace under consideration is a holding furnace, some of the difficulties of melting will be inherited. The use of checkers, like those in open-hearth furnaces, will make a complicated holding furnace.

If the holding period is not to exceed about two hours, an insulated covered holding ladle should be considered. Many steel foundries hold steel in the ladle for an hour while pouring, with a temperature drop not exceeding 100° F. If metal is tapped into a well preheated ladle with a thick lining and then covered with an insulated cover, it should be possible to hold for two hours with a temperature drop of less than 150° F. This temperature drop can be overcome by tapping at 3200°, the temperature of a normal shank heat. The initial temperature drop of about 100° F, plus the holding loss of 150° F should still yield metal at 2950°, which, if anything, still is too hot for large castings.

If at all possible, the metal that has been held should be lip poured into the ladle containing the second tap. Otherwise there may be complications. A teapot spout on the holding ladle is certain to freeze up. It is uncertain if a bottom-pour stopper rod will hold up for two hours. Then too, there will be a loss of alloys, especially manganese, if the holding ladle is acid lined. Alloy content can be adjusted by the second tap if the metals are mixed. Transferring the held metal into another ladle and adding alloys will cool it another 100 to 150°, perhaps make it too cold to pour, even with bottom pouring. Lip pouring direct from the holding ladle is just asking for slag in the casting.

## Information on $CO_2$ Process

**We operate a small foundry in India with two cupolas and four pit furnaces for melting cast iron. We would like to have further details on the $CO_2$ process. Because of import restrictions we are unable to obtain any proprietary sodium silicate binder, and we would like to know the grade of silicate used and what addition agents are employed. Also could you send us a list of books on cupola operation, sand mixes, $CO_2$ process, etc.?**

Sodium silicate used in the $CO_2$ process usually is the low alkali to silicate ratio type ($Na_2O : SiO_2$) from 1:2 to 2.4 which contains such additives as invert sugar, molasses, dextrin, starch, glycerin, glycol, fatty acid, urea resin, etc. One author indicates that three types of sodium silicate are being used with the following characteristics: No. 1—alkali to silicate ratio 1:2, viscosity (poises) 2-4 Baume 50°; No. 2—alkali to silicate ratio 1:2.4, viscosity (poises) 15-30, Baume 52°, and No. 3—alkali to silicate ratio 1:2, viscosity (poises) 700, and Baume 59°. Of these grades the No. 2 type most commonly is used.

In addition to the additives in the silicate binder, it is common practice to add small amounts of such materials as seacoal, pelleted pitch, wood flour, iron oxide, etc., to the sand mixture to promote collapsibility. A number of articles relating to various phases of the $CO_2$ process have been published in FOUNDRY, and include the following:

"The $CO_2$ Process—Its Use in British Foundries," June, 1955; "Recent Developments in the $CO_2$ Process," January, 1956; "Hardening Sand with $CO_2$," March, 1956; "Indian Foundry Uses $CO_2$ Process to Advantage," August, 1956; "$CO_2$ Cores Reduce Production Costs," October, 1956; "Impeller Castings Are Made with $CO_2$ Process," October, 1956; "Making Ship Propellers with $CO_2$ Molds and Cores," February, 1957; "What You Should Understand About the Carbon Dioxide Process," June, 1957; "Steel Foundry Uses New $CO_2$ Gassing Technique," August, 1957; "$CO_2$ Process Useful in Producing Experimental Castings," March, 1958; "Mold for Making Repair Part Uses $CO_2$ Process Drawbacks," March, 1958, and "Casts Large Propeller with $CO_2$ Process," June, 1958.

Books which will be of interest to you include *The Cupola and Its Operation, Alloy Cast Irons Handbook, Analysis of Casting Defects, Foundry Core Practice,* and *Gray Iron Castings Handbook.*

## Producing Arsenical Copper

**Can you give us any information on how 1 per cent arsenic can be added to copper, and what precautions should be taken? We use oil-fired crucible furnaces, and the castings are about 6 in. square and 1 in. thick.**

Arsenical copper in the wrought form such as staybolts and locomotive firebox plates is being used for temperature resistance since the arsenic inhibits recrystallization. Amount usually is limited to 0.5 per cent. We can see no reason for its presence in copper castings be-

cause they are not subject to recrystallization unless they are worked in some fashion.

Preparation of arsenical copper is hazardous because the fumes are poisonous, but you can purchase a 30-per cent master alloy which will cut out one step in the procedure. Make your mixture by adding 3 lb 5 oz of the master arsenic-copper to 96 lb 11 oz of copper. Do not fail to take every precaution to protect the operators since poisonous arsenic fumes will be given off during melting and pouring. Those operations should be conducted under hoods which exhaust positively to outside the foundry. Operators also should be equipped with gas masks which employ specific filtering agents for removal of arsenic fumes.

## Resisting High Temperatures

**We have been requested to supply a gray iron casting to withstand a temperature around 2200° F, and will appreciate information on a suitable composition. Castings must be machinable.**

Up to the present time research workers have not been able to develop metals or alloys which will withstand temperatures of 2000° F continuously without failure so you hardly can expect to meet your customer's request. However, we doubt that the casting in question will have to resist continuously the temperature mentioned, but without information on the application it is difficult to make any suggestions.

Irons containing 22 to 26 per cent chromium are reported to operate satisfactorily at temperatures up to 1800° F where not subject to shock, but they are not machinable. A high nickel-copper-chromium alloy iron known as NiResist containing about 14 per cent nickel, 6 per cent copper and 2 per cent chromium is claimed to withstand temperatures around 1500° F. That iron is machinable, and possibly might meet your customer's requirements.

## Surface Finish Is Not Good

**We are pouring a 50-lb copper casting in a cast iron mold. Gate is at the bottom and one end of the mold. Castings are satisfactory except for surface finish. We have been unable to develop a satisfactory mold coating. Can you suggest a solution to our problem?**

Since no details of the unsatisfactory surface finish are given, it is difficult to determine whether it is due to the mold coating or something else. The trouble may arise from the method of applying the coating rather than the coating itself.

It is preferable to spray on the mold coating in thin layers. The mold should be hot enough to dry the coating rapidly, but not hot enough to cause the formation of steam bubbles. Coats should be rubbed down between applications with steel wool. Several thin coats will adhere much better than one heavy coat.

As you undoubtedly know, there are a number of proprietary mold coatings on the market, and we suggest you obtain one rather than try to make your own. In general, such coatings are composed of some type of refractory such as kaolin, whiting, aluminum oxide, graphite, rouge, talc, etc., suspended in water with or without addition of sodium silicate as a suspension agent. Combinations of those materials also may be used.

If you want to experiment, you might try adding 12 oz of 40 per cent sodium silicate solution, 10 oz whiting and 1 oz graphite or rouge to 1 gallon of boiling water, stirring well. The solution is used cold, and because of the tendency of the whiting and graphite or rouge to settle, the mixture should be stirred well before use.

## Breaking Large Metal Chunks

**We are conducting a study to determine what feasible methods exist or are in use today in the size reduction of chills and molds of metallic consistency, and whether any descriptive articles are available. To aid you the following basic data are given:**

**The chills weigh approximately 5000 lb, are 14 to 16 in. thick, and have an oval shape with a long diameter of 6 ft. These chills consist primarily of iron and are produced from the metal tap of a phosphorus, electric-arc furnace. The desired end product, following size reduction, can range from plus 6 mesh to minus 10-in. lump, and we are interested in reducing methods such as flame cutting, milling, or impact.**

We suspect from the rather involved description and the terms employed, that the material is ferrophosphorus tapped from the electric furnace. Since ferrophosphorus is a relatively brittle material, it is somewhat surprising that the cast or tap was not poured out into a bed which would result in metal only a few inches thick. That would permit breaking up with a sledge into pieces which could be handled to crushers for further reduction in size.

However, your present problem of reducing the 14 to 16-in. thick, 5000-lb lump of metal to the sizes mentioned is something else. We

believe that the first step would be to place the chunk under a skull-cracker or drop ball machine. Since ferrophosphorus is brittle, it will be broken up by the drop ball into several pieces, and by repeated dropping of the ball, into pieces small enough to be fed into a suitable jaw crusher or series of jaw crushers for reduction to the finer sizes. If the preference is for only the coarser sizes, then the drop-ball procedure alone might be the answer.

## Marking Patterns on Plate

**We have some matchplates which were made without identification marks, and now we would like information on how marking could be accomplished. Markings may be raised or sunk in the patterns.**

You do not indicate whether the markings you have in mind are pattern numbers or letters or some type of insignia such as a trademark. Metal numbers and letters in various sizes can be purchased and fastened in place through use of epoxy type adhesives. An insignia would have to be made but could be applied in a similar manner.

Possibly the markings could be placed on the patterns by use of a steel stamp, but there is likely to be some distortion or bulging around the stamp edges as well as nonuniformity of impression. Unless carefully done there also may be some distortion of the plate.

## Mix for Hard Sand Matches

**Can you supply us with a good formula for making hard sand matches which will hold up for normal production runs? We understand that sand mixed with litharge and linseed oil gives good results.**

While home-compounded mixtures for sand matches have been used with more or less success, we believe that you will be much better off by purchasing a proprietary material. Known as pattern compounds, they will give consistent results when used according to the manufacturer's directions. That cannot always be said for the home-made mixes which offer too much temptation for experimentation.

As might be expected, a variety of formulas has been used, but the following are reported to give satisfactory results. One is made of 50 per cent dry burned sand and 50 per cent dry new molding sand. That is mixed dry with litharge, using 40 parts sand to 1 part litharge. Sufficient linseed or core oil then is added to provide a consistency similar to molding sand.

In another mix, linseed oil previously mixed with litharge is added to dry, new molding sand. The oil-litharge solution is prepared by mixing 8 parts by weight of boiled linseed oil and 1 part of litharge.

## Cylinders Show Leaky Areas

**In manufacturing cast iron cylinders for hydraulic units which must withstand pressures of 1500 psi without leakage, we are having trouble with the latter in the stud area. These cylinders are 13 in. long, 3-in. ID, with a ⅜-in. wall. They are poured almost horizontally using a horn gate at the bottom, 2 in. from the end, and a sow gate in the cope which crosses the horn gate. We have tried feeding without any results. Use of a blind riser at the high end helps slightly, but does not eliminate the leakage. We are using about 20 per cent pig containing 2½ per cent Si with clean cast scrap.**

Leakage in your cylinders is caused by a small shrinkage area resulting from the difference in cooling rate between the main body of the cylinder and the enlargements on the ends for insertion of the studs. They are about double the thickness of the cylinder wall and solidify much slower. With your gate attached some distance behind the heavy section, feeding must be accomplished through the thinner section. The latter freezes first, however, and cuts off the feed to the heavier portion.

We believe a change in gating will provide proper feeding, and suggest cutting cross gates in the ends of the core to the heavier section. The gates are attached to a sprue at one end and a riser at the other, with both placed as close to the casting as possible. Possibly the riser at the far end can be eliminated because of the temperature loss in the iron as it flows through the thinner section; this drop results in the heavier section cooling at about the same rate as the hotter thin section.

## Manufacture of Matchplates

**Can you supply us with any information on making matchplates? For example, what size flask is best suited for this and what sand is employed to provide the smoothest surface?**

While it is preferable to use a metal flask for making matchplates, wood flasks may be employed if they have the required stiffness or rigidity. Size of the flask will depend on matchplate dimensions, and should be about 6 in. wider and about 12 in. longer than the plate. Additional length is for the ears on the ends of the matchplate.

As you undoubtedly know, fine sand gives the smoothest surface, but it may cause blows through lack of permeability. Hence, you will have to compromise and select a sand which is fine enough to provide a satisfactory smoothness without causing blows. Possibly a sand with AFS fineness of 210 to 260, clay content of 15 to 22 per cent, and 6 to 7 per cent moisture might be satisfactory.

## Porosity in Chunky Casting

**We have been encountering considerable trouble in trying to make solid aluminum alloy blocks about 5 x 8 x 12 in. Difficulty is that they show porosity in the form of fine pinholes with dark specks. We have tried pouring at temperatures from 1200 to 1450° F, and have tried risers up to 3 to 1 in various positions without results. We also have introduced dry nitrogen into the molten metal at various time intervals from 5 to 10 minutes before pouring using a No. 100 crucible.**

Production of chunky castings free from shrinkage in the center always is a problem since freezing or solidification advances from all of the metal-mold interfaces cutting off feeding to the central portion.

If these castings are as you indicate—blocks with six flat faces—solid pieces will be obtained by use of an open mold and application of chills on the bottom and four sides. Top portion of the mold is extended to act as the feeder or head. Preferably the extension should be made of baked core sand, firebrick, or insulating material which will permit the metal to remain liquid for a longer period of time.

"X-ray" view of wheel shows pronged anchor bushing and safety ring.

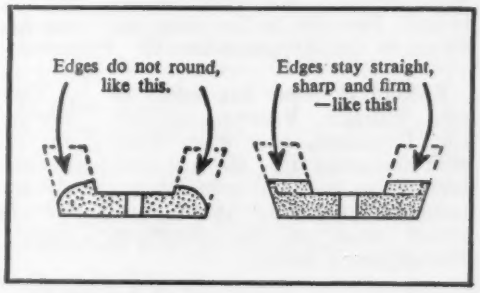
## The fast, safe wheel for portable grinding!

Using a lightweight grinder equipped with a Royalite Hard Shell Cup Wheel to snag a grey iron man-hole cover casting. The combination of this grinder and the safer, smooth-running Royalite Wheel means a better job in less time—with less worker fatigue.

## The new
# U. S. ROYALITE
## HARD SHELL CUP WHEEL

The above cutaway drawing shows the safety secret of U. S. Royalite®: *the pronged anchor bushing and safety ring constitute a reinforcement that makes a safer and a smoother-running cup.* And Royalite's tougher rim keeps the edge sharp for the full life of the wheel. For today's lightweight portable grinders, this is the most economical, most efficient wheel.

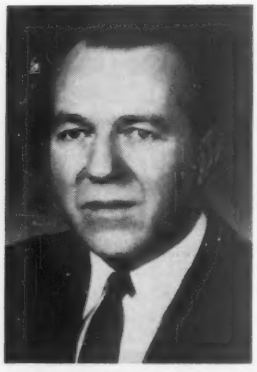
The U. S. Royalite Hard Shell Cup Wheel is just one of several new grinding wheel developments coming from U. S. Rubber. Get in touch with wheel specialists through U. S. Rubber, 312 N. Hill St., Mishawaka, Indiana, your local "U. S." District office, or by writing us at address below.



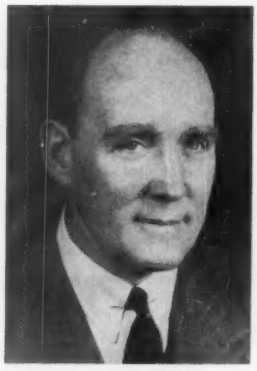

Mechanical Goods Division
**United States Rubber**
WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS
Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.


Circle 601 on Page 51

# Men of Industry



● ALBERT P. GAGNEBIN



● JOSEPH M. WELDON

*International Nickel Co. promotions*

● SAMUEL W. GEARHART JR.

*. . . chief metallurgist*

● CECIL N. KING

*. . . heads Detroit Chapter*

**Albert P. Gagnebin,** assistant vice president and manager of the nickel sales department, has been elected a vice president, International Nickel Co., New York. With the company since 1930, previously he was head of the ductile iron section of Inco's Development and Research Division. In 1952, with Keith D. Millis, who later succeeded him in the latter position, Mr. Gagnebin was co-recipient of the Peter L. Simpson Gold Medal of the American Foundrymen's Society for outstanding work and development in the field of spheroidal cast iron. **Joseph M. Weldon** has been elected an assistant vice president of International Nickel Co. After joining the company in 1927, he held various positions in the sales, executive, and other departments. Recently he has been assistant to the vice president.

**Richard H. Stone** has retired as sales manager, Vesuvius Crucible Co., Pittsburgh, after many years with the company. He had long been active in the Crucible Manufacturers' Association and in committee work of the American Foundrymen's Society.

**Harold Browning** recently joined Bay City Foundry Co., Bay City, Mich., as general superintendent. He has been with Baker Perkins Inc., Saginaw, Mich., for 22 years. **Richard W. Thomas** has been appointed sales representative for Bay City Foundry in Maryland, Delaware, New Jersey, and part of Pennsylvania.

● **Samuel W. Gearhart Jr.,** metallurgical consultant and sales engineer, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has been appointed chief metallurgist. Before he joined the company two years ago Mr. Gearhart was with Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

**George Pekrol** has been appointed factory manager, Dollin Corp., Irvington, N. J. He joined the die-casting firm in 1945 and has been chief estimator for the last five years.

**John S. Smart Jr.,** formerly assistant director of research, has been appointed general sales manager, American Smelting & Refining Co., New York. **Ralph L. Wilcox** has been named assistant sales manager.

**Thomas H. Thoresen** has been named field sales manager, Hannifin Co., Des Plaines, Ill., a division of Parker-Hannifin Corp. He joined the company in 1945 and has been Cleveland regional sales manager since 1954.

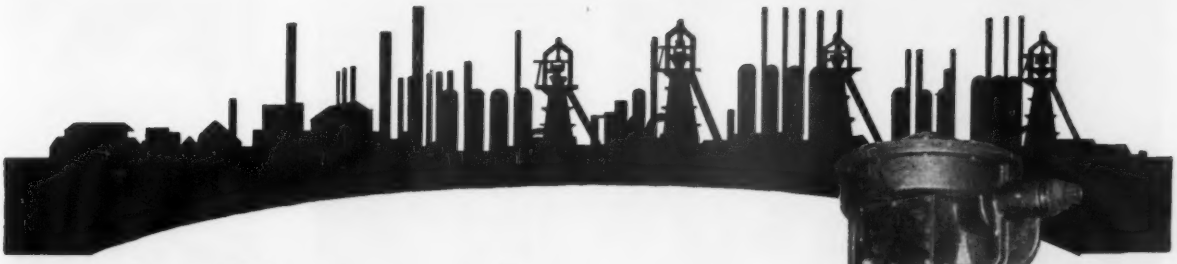
**C. W. Gilchrist,** assistant works manager, Cooper-Bessemer Corp., Mt. Vernon, Ohio, represented the United States at the Seventh International Conference of Spheroidal Graphite Iron Licensees, held at Brussels, Belgium, Sept. 26. He reported on development of riserless ductile iron castings. Mr. Gilchrist is a national director of the American Foundrymen's Society.

● **Cecil N. King,** chairman of the Detroit Chapter of the AFS for 1958-59, is plant manager, Forge & Foundry Div., Chrysler Foundry Detroit Plant. A graduate of Howard College and Alabama Polytechnic Institute, he received a master's degree in automotive engineering from Chrysler Engineering Institute in 1951. He worked as molding foreman at the company's Dodge and Winfield Foundries and spent a year with Central Foundry Div., General Motors Corp., Detroit. In 1955 Mr. King returned to the Winfield Foundry as plant manager.

**Dr. A. Eugene Schubert,** manager of the chemical development department, has been named general manager of the chemical materials department, Chemical and Metallurgical Div., General Electric Co., Pittsfield, Mass. Dr. Schubert succeeds **Sam L. Brous,** who will take over the former duties of **James W. Raynolds,** as marketing manager. Mr. Raynolds has been assigned as a consultant to the general manager of the division, **Robert L. Gibson.**

**B. J. Deisenroth Jr.,** has been appointed superintendent, Fremont Flask Co., Fremont, Ohio, succeeding the late Leon E. Koleman.

**Jack L. Stroman** has joined the Hevi-Duty Electric Co., Milwaukee, as a furnace consultant. Mr. Stroman founded Stroman Furnace & Engineering Co., recently acquired by Hevi-Duty. Others transferred from the Stroman staff to Hevi-



for *Precision Castings*
of *Rugged Strength*

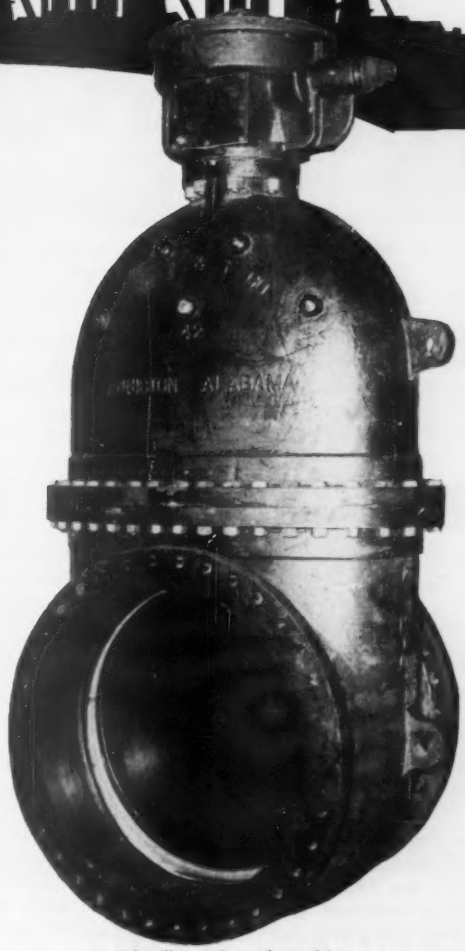
***specify uniform***

# WOODWARD IRON

First and vitally important step in the manufacture of pressure castings that must withstand stress and strain is the use of quality raw materials.

For this rugged and efficient 15,800-pound bell-end gate valve, the nationally-known M. & H. VALVE AND FITTINGS COMPANY, Anniston, Ala., used Woodward iron. The valve is 14 feet high and approximately 6 feet wide and is manufactured to American Water Works Association specifications.

In many of the nation's leading foundries, uniform Woodward iron has demonstrated its superiority for castings of precise design, exact finishing and rugged strength. Your inquiries are invited.



*Valve illustrated manufactured by*
M. & H. VALVE & FITTINGS COMPANY
*A Subsidiary of The Walworth Company*
Anniston, Alabama

**For quotations, write or call our Sales Department, Woodward, Ala.**
**Phone Bessemer, Ala. HAmilton 5-2491**
**or Sales Agents for territory North of Ohio River:**
**HICKMAN, WILLIAMS & COMPANY with Sales Branches at—**

609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1659 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Bldg., Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Bldg., Indianapolis 4, Ind.; 70 Pine St., New York 5, N. Y.; 1500 Walnut Street Bldg., Philadelphia 2, Pa.; 1910 Clark Bldg., Pittsburgh 22, Pa.; 902 Syndicate Trust Bldg., St. Louis 1, Mo.

## WOODWARD IRON COMPANY

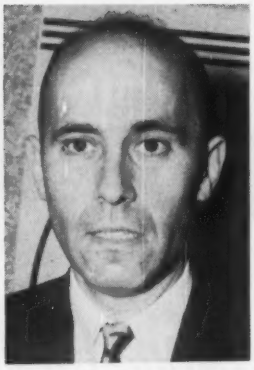
WOODWARD, ALABAMA

*Independent Since 1882*

## MEN OF INDUSTRY

● **FRED DISCHINGER**
*Kolcast Industries Div. appointments*

● **HAROLD D. BLAKE**



● **HANS J. HEINE**
*. . . technical director, MFS*

● **DR. H. NATHAN STONE**
*. . . director of research*

Duty include **J. C. Smith,** former sales manager, **John Denzien,** manager of the combustion engineering department, and **Henry R. Kaht Jr.,** sales engineer.

● **Fred Dischinger** has been appointed plant manager, and **Harold D. Blake,** chief engineer, Kolcast Industries Div., Thompson Products Inc., Minerva, Ohio. Prior to joining Kolcast in 1954 as chief engineer, Mr. Dischinger was chief design engineer, Haynes Stellite Co., Kokomo, Ind. With Thompson Products since 1947, three years ago Mr. Blake was named design supervisor and later supervisor of engineering with the Kolcast-Tapco group.

● **Dallas Marsh,** elected chairman of the Central Ohio Chapter of the AFS for 1958-59, has been foundry superintendent at Cooper-Bessemer Corp., Mt. Vernon, Ohio, for the last two years. Following graduation from Ohio State University in 1951, Mr. Marsh joined Cooper-Bessemer as a foundry engineer trainee. He became assistant foundry superintendent in 1955.

● **Hans J. Heine** has been appointed technical director, Malleable Founders' Society, Cleveland. He holds a degree in mechanical engineering and a master's degree in metallurgy. His industrial background includes 12 years with General Electric Co., Schenectady, N. Y., Aluminum Co. of America, and Rockwell Mfg. Co. Mr. Heine was technical and research director, American Foundrymen's Society from 1953 until 1956, when he joined American Society for Metals, Cleveland. Until recently he was technical director of the Publication Development Division there.

● **Arthur C. Buesing,** until recently with Gray Iron Research Institute Inc., Columbus, Ohio, has joined Brown Thermal Development Co., Elyria, Ohio, as vice president-foundry sales. He formerly was with Modern Equipment Co., Port Washington, Wis.

● **John Wishart** has joined Reichhold Chemicals (Canada) Ltd., Toronto, where he will direct sales and service of its foundry products division in Ontario.

● **Dr. H. Nathan Stone** has been named director of research and development, Bay State Abrasive Products Co., Westboro, Mass. Prior to joining the company in 1952, he was a research engineer, Norton Co., Worcester, Mass. Dr. Stone has replaced **Albert L. Ball,** who has retired and will continue as technical consultant for Bay State.

**Dale J. Richards,** formerly Detroit district representative, has been named manager in charge of the district office and warehouse there for the Beryllium Corp., Reading, Pa.

**Kurt F. Wendt,** dean of the College of Engineering, University of Wisconsin, has been appointed a member of theNational Research Council. Dean Wendt will represent the American Society for Engineering Education in the division of engineering and industrial research on the council.

● **F. B. Wilkinson** has been named president, Logansport Machine Co., Logansport, Ind., succeeding **Mrs. E. P. Wilkinson,** who has been

● **DALLAS MARSH**
*. . . AFS Chapter chairman*

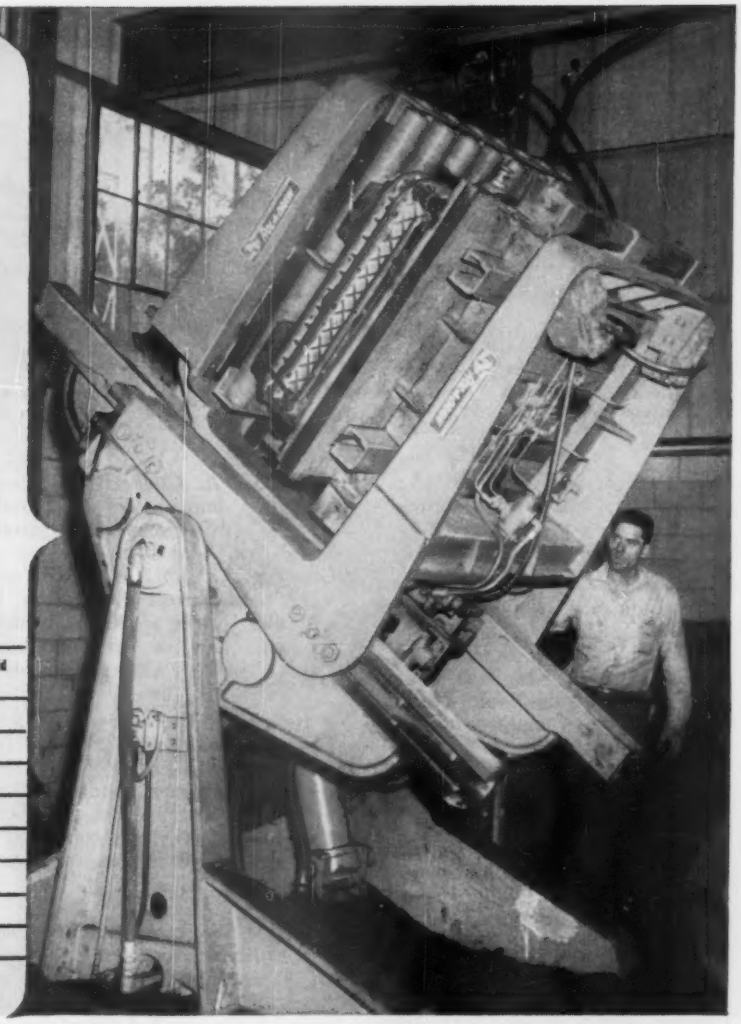
● **ARTHUR C. BUESING**
*. . . foundry sales v. p.*

● **JOHN WISHART**
*. . . Reichhold Canadian sales*

● **F. B. WILKINSON**
*. . . Logansport Machine pres.*

# NOW! A NEW ROL-A-DRAW FOR EVERY CAPACITY

## 1000 to 15000 LBS.



| Hydraulic* Rol-A-Draw | Capacity | Draw | Max. Ht. of Mold or Core Box |
|---|---|---|---|
| 1015 H | 1000 # | 15" | 32" |
| 1020 H | 1000 # | 20" | 42" |
| 2522 H | 2500 # | 22" | 50" |
| 4025 H | 4000 # | 25" | 58" |
| 6030 H | 6000 # | 30" | 69" |
| 9030 H | 9000 # | 30" | 69" |
| 12032 H | 12000 # | 32" | 73" |
| 15032 H | 15000 # | 32" | 73" |

*Full hydraulic operation—pattern clamp—clamping—rollover—draw —(air pattern clamp on 1015H and 1020H—optional on 2522H)

## CHECK THESE FEATURES THAT **SAVE** YOU MONEY

- ✓ *Lower initial cost*—costs far less than other units of equal capacity
- ✓ *No pits* of any kind required for installation—this alone saves thousands of dollars
- ✓ Rugged steel castings—*heaviest construction* throughout—less maintenance—lower operating cost
- ✓ Unapproachable flexibility—outstanding range—handles present and *future* requirements

## CHECK THESE FEATURES THAT **MAKE** YOU MONEY

- ✓ Automatic sequence control—a single valve actuates entire cycle—errors eliminated, production speeded
- ✓ Extra large capacity—handles bigger molds and deeper draws—eliminate costly crane delays.
- ✓ Super-accurate draw—controlled slow draw—assures precision that means extra profit
- ✓ Automatic clamping—automatic equalizing. Never a slowdown—fastest cycle of any machine

B&P

**ALL HYDRAULIC**

**ROL-A-DRAW**

**FOR MOLDS AND CORES**

***Beardsley & Piper***
***Div. Pettibone Mulliken Corp.***
***2424 N. Cicero Ave. • Chicago 39, Ill.***



Circle 603 on Page 51

● ARTHUR W. OSTRANDER
*. . . becomes sales v. p.*

● KENDALL HERRON
*. . . district sales mgr.*

● THOMAS A. CLAIBORNE
*. . . sales district mgr.*

● HAROLD Y. HUNSICKER
*. . . Alcoa research*

made chairman of the board of directors. Mr. Wilkinson formerly was vice president.

● **Arthur W. Ostrander,** sales manager, Enterprise Engine & Machinery Co., San Francisco, subsidiary of General Metals Corp., Oakland, Calif., has been elected vice president-sales for General Metals. He will continue to manage Enterprise sales.

● **Kendall Herron** has been named Cleveland district sales manger by Alloys & Chemical Mfg. Co., there. Before he joined the company in 1952 as sales engineer he was with Electroloy Co., Bridgeport, Conn., and Swartwout Co., Cleveland.

**James A. Cloutier** has joined the Chicago sales office, Bay State Abrasive Products Co., Westboro, Mass., and will represent the company in northern Indiana.

● **James L. Payne,** sales manager of Ross-Meehan Foundries, Chattanooga, Tenn., has been elected vice president in charge of sales.

● **Thomas A. Claiborne** has been appointed manager of the southwest sales district recently established by Tennessee Products & Chemical Corp., Nashville, Tenn. With headquarters in Houston, he will direct sales of the company's products and of its subsidiary, Tenn Tex Alloy Corp., Houston.

● **Ralph W. Brown,** recently with Flannery Bolt Co., Pittsburgh, has been appointed railway and industrial sales engineer, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., to represent the company in Baltimore, Philadelphia, and eastern United States.

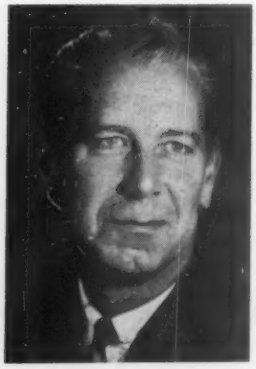
**Archie Stevenson,** recently assistant superintendent, Fulton Foundry & Machine Co., Cleveland, has been appointed superintendent. He succeeds **George T. Clifford,** retired.

● **Thomas E. Douglass** recently joined Simonds-Worden-White Co., Dayton, Ohio, as assistant to the president. He formerly was manager in charge of product development and technical sales, Vernay Laboratories, Yellow Springs, Ohio.

● **Harold Y. Hunsicker,** since 1948 assistant chief of the Cleveland division research laboratories, Aluminum Co. of America, has been named chief of the physical metallurgy division of the company's research organization, with headquarters in New Kensington, Pa. He joined the company's Cleveland research division in 1936 after graduation from Purdue University.

Mr. Hunsicker succeeds **Dr. William L. Fink,** who has headed the physical metallurgy division since 1943. Dr. Fink has been named scientific co-ordinator of the laboratories. **J. A. Nock Jr.** has been made chief of the new fabricating metallurgy division. **J. P. Lyle,** research metallurgist, has taken over Mr. Nock's former duties as assistant chief of physical metallurgy.

● **William H. Faust,** elected chairman of the Central Indiana Chapter of the AFS for 1958-59, since 1950 has been manager of plant equipment and maintenance engineering, Electric Steel Castings Co., Indianapolis. He was graduated from Michigan State University, and following Army service in the



● JAMES L. PAYNE
*. . . Ross-Meehan sales v. p.*

● RALPH W. BROWN
*. . . joins Birdsboro Steel*

● THOMAS E. DOUGLASS
*. . . executive assistant*

● WILLIAM H. FAUST
*. . . AFS Chapter chairman*

YOU CAN'T HELP BUT

# CUT COSTS...

when "SEMI-STEEL"

STEEL TYPE ABRASIVES

COST YOU ONLY

$155.00 PER TON

in 50 or 100 lb. bags, palletized if desired

"SEMI-STEEL" performance compares so favorably with that of regular, high grade steel shot that, considering you pay only $155 per ton, you just can't help but reduce your cleaning costs. And, we'll give you a *written guarantee* that you will!,

"SEMI-STEEL" is a newly developed abrasive with marked steel shot characteristics, produced by a new process so efficiently that it can be sold at extremely low prices. It's manufactured as shot and grit, to S.A.E. specifications.

Why continue paying so much for steel shot when "SEMI-STEEL" costs so little and is guaranteed to save you money? Phone or write for further information and samples.

**FREE LAB TEST**

Send us 200 gr. of your steel shot. We'll test it against "SEMI-STEEL" and report the results. Or, we'll send samples of "SEMI-STEEL" for testing in your own lab. (Give size.) Either way, you'll get welcome proof of "SEMI-STEEL" savings.

Beach wear by Jantzen

## METAL BLAST, INC.

872 EAST 67th STREET

CLEVELAND 3, OHIO

● JOHN A. MAHONEY JR.
. . . joins Pangborn Corp.

● FRED W. ELLIS
. . . Climax Molybdenum sales

● WESLEY S. HODGE
. . . AFS Chapter chairman

● T. LEWIS THOMAS III
. . . General Smelting v. p.

Pacific Theatre during World War II, spent a year in Manila, P. I., as personnel administrator. In 1948 he joined Electric Steel Castings Co. as an assistant melter in the electric furnace department.

● **John A. Mahoney Jr.**, formerly with Reeves Pulley Co., Columbus, Ind., has joined Pangborn Corp., Hagerstown, Md., as sales engineer in the Philadelphia district office.

● **Fred W. Ellis** has been appointed foundry sales representative in the Dayton, Ohio, area for Climax Molybdenum Co. Div., American Metal Climax Inc., New York. He succeeds the late Herbert C. Geittman. Until recently Mr. Ellis was a foundry engineer, Hamilton Foundry & Machine Co., Hamilton, Ohio.

● **George D. Nicholson** has been named sales representative, Cement-Coke Div., Diamond Alkali Co., Cleveland, to cover parts of West Virginia, Pennsylvania, and Ohio. He formerly was with Cooper-Bessemer Corp., Mt. Vernon, Ohio.

● **Wesley S. Hodge**, chairman of the Northwestern Pennsylvania Chapter of the AFS for 1958-59, is president, W. S. Hodge Foundry Inc., Greenville, Pa., which was founded with his father, Thomas S. Hodge, in 1937. He attended Carnegie Institute of Technology and took extension courses at University of Wisconsin and Pennsylvania State University. His early experience was as an apprentice in the foundry of Hodge Mfg. Co., Greenville, founded by his grandfather, E. W. Hodge.

● **George R. Sullivan** recently was elected vice president, A. P. Green Fire Brick Co., Mexico, Mo. He will continue as director of industrial relations, a position he has held for the last nine years. He has been with the company 39 years.

● **William W. Moore** has been elected vice president-sales and a director, Research - Cottrell Inc., Bound Brook, N. J. With the company since 1946, for the last five years he has been New York district sales manager.

● **T. Lewis Thomas III**, formerly purchasing manager, has been named a vice president, General Smelting Co., Philadelphia. He joined the company in 1948.

**H. C. Hoover**, since 1948 works manager of the Coraopolis, Pa., plant, Blaw-Knox Co., Pittsburgh, retired recently. Mr. Hoover joined Ohio Steel Foundry, Lima, Ohio, in 1908 as an apprentice molder. He joined Blaw-Knox in 1941 as general superintendent of the Coraopolis plant.

**Thomas C. McConnon**, formerly with Eureka Fire Brick Co., Mt. Braddock, Pa., has been named manager of the steel division recently created by Pittsburgh Metals Purifying Co., Mars, Pa.

● **Donald E. Matthieu**, chairman of the Piedmont Chapter of the AFS for 1958-59, is vice president and general manager, Wysong & Miles Foundry Inc., a division of Wysong & Miles Co., Greensboro, N. C. A graduate of Birmingham-Southern College, his former connections include American Brake Shoe Co.,

● GEORGE D. NICHOLSON
. . . Diamond Alkali sales

● GEORGE R. SULLIVAN
. . . Green Fire Brick v. p.

● WILLIAM W. MOORE
. . . Research-Cottrell v. p.

● DONALD E. MATTHIEU
. . . heads Piedmont Chapter

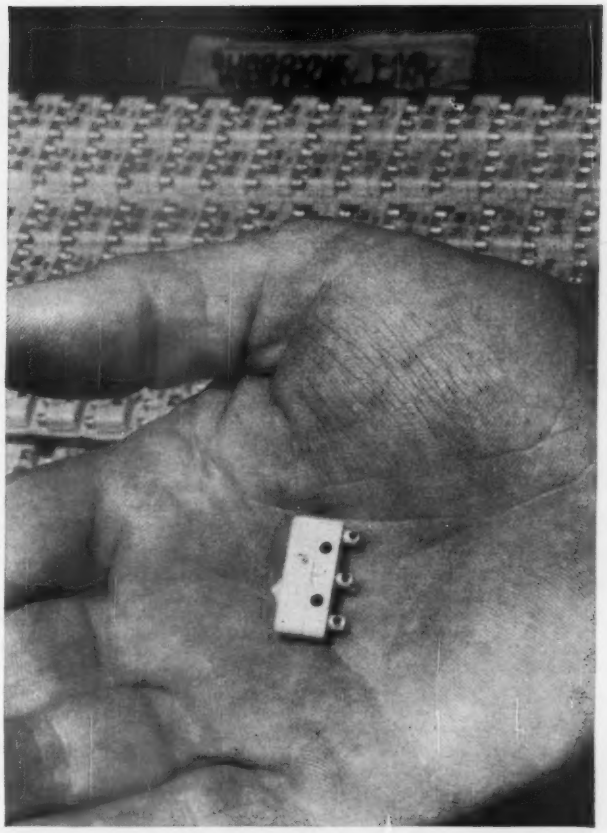
# Sealed tight!

## Yet inside contacts must be critically aligned and spaced

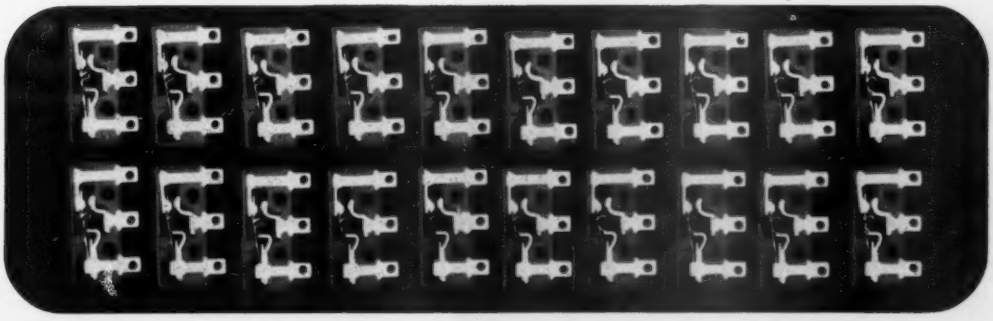
Specifications for these miniature switches are rigid. But one special military project (ballistic missiles) demands extra precision. Tolerances are reduced to a minimum.

What nondestructive test could be used to check the critical contact spacing and alignment? *The answer was radiography*—and the manufacturer assigned the inspection problem to the Burgoyne Testing Laboratory, Westbury, L.I. Radiographs of the switches—by lots—make it possible to select those that meet specifications.

In the quality control of cast or welded products and hidden assemblies, radiography plays an outstanding role. Perhaps it can help you to be sure that only acceptable items are delivered—a saving of time and money, and a great aid in building business. Why not call your x-ray dealer —or the Kodak technical representative—and talk it over.



One of the miniature switches about to be radiographed at Burgoyne Testing Laboratories, Westbury, Long Island.



Radiograph shows critical spacing of the switch contacts.

## Read what Kodak Industrial X-ray Film, Type AA, does for you:

- Speeds up radiographic examinations.
- Gives high subject contrast, increased detail and easy readability at all energy ranges.
- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

**EASTMAN KODAK COMPANY, *X-ray Division*, Rochester 4, N. Y.**

Kodak
TRADE MARK



*Circle 605 on Page 51*

# OREFRACTION®

Trade Mark Registered U.S. Pat. Office

# ZIRCON

# FLOUR

- ZIRCON FOUNDRY FLOUR
  140, 200, 400 Mesh Sizes

# SAND

- DOMESTIC & AUSTRALIAN ZIRCON FOUNDRY SANDS

Send for Data Sheet

*DISTRIBUTED BY:*

**BARKER FOUNDRY SUPPLY CO.,** Los Angeles; San Francisco

**HOFFMAN FOUNDRY SUPPLY CO.,** Cleveland

**FREDERICK B. STEVENS, INC.,** Detroit; Buffalo; Indianapolis

**PENNSYLVANIA FOUNDRY SUPPLY & SAND CO.,** Philadelphia; New York; New England

**M. A. BELL CO.,** St. Louis; Tulsa; Houston; Denver

**LAGRAND INDUSTRIAL SUPPLY CO.,** Portland, Ore.

**G. E. SMITH, INC.,** Pittsburgh, Pa.

**MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee

**JOHN P. MONINGER,** Chicago

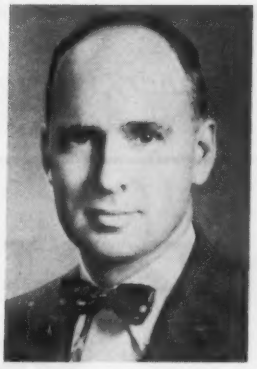
**EXPORT DEPARTMENT:** 1010 Schaff Bldg., Philadelphia, Pa.

**CANADIAN FOUNDRY SUPPLIES & EQUIP. CO., INC.,** Montreal; East Maritimes

**CANADIAN HANSON & VAN WINKLE CO., LTD.,** F. B. Stevens Division, Windsor; Toronto

*Orefraction*
MINERALS INC.
ANDREWS, SOUTH CAROLINA

● **MAX READING**
*. . . AFS Chapter chairman*



● **R. H. MERRIMAN**
*. . . Airco district mgr.*

● **DAVID J. RICHARDS**
*. . . retires, Houghton & Co.*

● **LOUIS B. POLEN**
*. . . AFS Chapter chairman*

Southern Wheel Div., Birmingham; Alabama Pipe Co., Anniston, Ala.; Kerchner, Marshall & Co., Richmond, Va. More recently he was assistant to the president and manager of foundries, Richmond Foundry & Mfg. Co., Richmond.

● **Max Reading,** elected chairman of the Eastern Canada Chapter of the AFS for 1958-59, is manager of the eastern Canada division, Foundry Services (Canada) Ltd., Beaconsfield, Que. A native of Birmingham, England, he was educated there and in Switzerland. Mr. Reading joined Foundry Services, Birmingham, in 1947 as a technical representative, and worked in other European branches of the company until 1950, when he was transferred to Canada and became division manager in 1956.

**J. E. Watson Jr.** has been named manager of the New Orleans district, Allis-Chalmers Mfg. Co., Milwaukee, succeeding **R. F. Muller,** who has retired after 38 years with the New Orleans district. **W. E. Scott** has been appointed manager at Miami, Fla., the post recently held by Mr. Watson. He was sales representative in the Charlotte, N. C., district for 6 years.

**Stuart F. Cooper,** since 1956 manager of advertising and sales promotion, Cooper Alloy Corp., Hillside, N. J., has been appointed sales manager for castings. He joined the company's Vanton Pump Div. in 1955 as sales engineer.

**Gordon C. Curry** has been appointed vice president in charge of sales, Dollin Corp., Irvington, N. J. He joined the company early this year as sales manager. Mr. Curry is vice president and a director of the American Die Casting Institute.

● **R. H. Merriman** has been named Buffalo district manager, Air Reduction Sales Co., New York, succeeding **H. J. Schlieder.** Mr. Schlieder was with Airco 38 years, the last 30 as manager of the Buffalo district. **F. C. Millspaugh Jr.,** sales assistant in Jersey City, has been assigned to Mr. Merriman's former duties as assistant manager-sales, there.

● **David J. Richards,** since 1945 vice president-sales, E. F. Houghton & Co., Philadelphia, has retired. He attended University of Pittsburgh and joined the company's sales department in 1917. **Frank Ross,** formerly Mr. Richards' assistant, has been named vice president-sales. **Charles R. Schmitt** has succeeded Mr. Ross as assistant to the vice president-sales.

**Roderick L. Smith** has been appointed a field engineer in the Indianapolis district office, Norton Co., Worcester, Mass. His former territory in North Dakota, Minnesota, and Wisconsin has been divided between **Edward A. Rogers** and **Carl Foltz Jr.,** formerly Chicago office field engineers. **Robert W. Bennett** has been assigned to western Iowa, eastern Nebraska, and part of South Dakota. **John H. Hartleb** will handle Oregon and northern California, and **John H. Saunders,** southwestern Pennsylvania and the Wheeling, W. Va., area. **Leo C. Johnson** has been appointed a field engineer in Chicago.

**Charles D. Bobbitt** has joined the Trojan Div., Yale & Towne Mfg. Co., Batavia, N. Y., as sales promotion manager for its tractor shovel line. For the last five years he has been with the Construction Machinery Div., Clark Equipment Co., Benton Harbor, Mich.

● **Louis B. Polen,** elected chairman of the Western New York Chapter of the AFS for 1958-59, is plant manager of the Buffalo foundry, Allegheny Ludlum Steel Corp. A graduate of West Virginia University, Mr. Polen also attended the graduate school of University of Pittsburgh. He joined Allegheny Ludlum in 1948 as plant metallurgist and became Buffalo plant manager in 1954. Previously he was with Ft. Pitt Steel Castings Co., McKeesport, Pa., and U. S. Steel Corp., Johnstown, Pa.

**Dr. G. H. Clamer,** president, Ajax Engineering Corp., Trenton, N. J., has been elected chairman of the board. **Manuel Tama** has succeeded him as president, and **Mario Tama** has been elected vice president. Dr. Clamer, who founded the company in 1941, is a past president of the American Foundrymen's Society and the 1933 recipient of its Joseph S. Seaman Gold Medal. Manuel Tama has been vice president and general manager of Ajax Engineering Corp. since its inception. Mario Tama has been secretary and research engineer since 1942.

**Norman F. Garrett** has been elected vice president and general manager for manufacturing, Crane Co., Chicago. For the last year he has managed the Chicago manufacturing division. **Walter Kovalick** has been named assistant general manager of the Chicago manufacturing division. He joined the company last year.

**Kenneth J. Schultz** has been appointed Chicago branch manager, Baker Industrial Trucks, Div. of Otis Elevator Co., Cleveland. He joined the company last year as a sales district manager.

*A Timely Message For Foundry Managements*

# FOUNDRIES CAN INCREASE PRODUCTION WITH LESS MANPOWER

Improved methods, layout, facilities and procedures will enable your foundry operation to meet today's demand for increased production and lower costs.

Knight Engineers have assisted many foundries to modernize methods, facilities and procedures to increase unit and total production, for gray and malleable iron, steel, brass and bronze, aluminum and magnesium castings.

Knight Engineers have revised existing incentive plans and installed new, equitable job evaluation, labor control and wage incentive plans which have resulted in increased production, lower costs and improved labor relations.

**For consultation on any foundry problem, large or small, call on Lester B. Knight & Associates, Inc.**

**KNIGHT SERVICES INCLUDE:**

Foundry Engineering • Architectural Engineering • Construction Management • Organization Management • Industrial Engineering • Wage Incentives • Cost Control • Standard Costs Flexible Budgeting • Production Control • Modernization • Mechanization • Methods Materials Handling • Automation • Survey of Facilities • Marketing

## Lester B. Knight & Associates, Inc.

Management, Industrial and Plant Engineers

*Member of the Association of Consulting Management Engineers, Inc.*

549 W. Randolph St., Chicago 6, Ill.

917 Fifteenth St., N.W., Washington, D.C.

New York Office—Lester B. Knight & Associates, 375 Fifth Ave., New York City 16

Knight Engineering Establishment (Vaduz), Zurich Branch, Bahnhofstrasse 17, Zurich, Switzerland

Lester B. Knight & Associates, G.M.B.H., Berliner Allee 47, Düsseldorf, Germany

# INTERNATIONAL FOUNDRY CONGRESS

## *Held in Brussels and Liege*

By M. M. HALLETT
*Managing Director*
Chamberlin & Hill Ltd., Walsall, England
*European Editor, Foundry*

DR. G. SCHWIETZKE
*President, International Committee*

THE International Foundry Congress was held in Belgium from Sept. 29 to Oct. 3. The opening ceremony took place in the grand auditorium at the Brussels International Exhibition, where the delegates were welcomed by R. Doat, president of the Belgian organizing committee of the congress, G. Schwietzke, the German president of the International Committee of Foundry Technical Associations, and by Mr. van der Elst, vice-chairman of the Association of Belgian Steel Makers. Most of the rest of the day was spent in touring the exhibition.

Remainder of the conference was held in Liege. Sept. 30 was occupied by technical sessions and by meetings of two international committees, Oct. 1 by works visits and by meetings of the remaining international committees, Oct. 2 by technical sessions and the closing ceremony, and Oct. 3 by works visits. The closing ceremony again was under the chairmanship of R. Doat and Dr. G. Schwietzke, with the addition of the new international vice president, Dr. A. Dacco of Italy, who will become president for the meeting in 1959.

At this ceremony the award of the International Committee (the Olivo prize) was presented to Prof. A. de Sy of the University of Ghent for his outstanding contributions to the metallurgy of cast iron. At the same ceremony it was announced that the international meetings in 1959 would be held in Madrid, in 1960 in Zurich, in 1961 in Vienna, and in 1962 in Detroit.

The president reported that the International Committee had decided to invite the Hungarian foundry association to become members.

Of the subcommittees, that on testing cast iron has continued its studies in accordance with its extended program. The committee on foundry defects has decided that it could dissolve itself, leaving the responsibility for the issuing of the "Album of Defects" in the hands of the French secretariat since there were no more policy questions to be settled. (It was pointed out that this would remove the word "defects" from the official agendas of future conferences in accordance with the views strongly expressed by the representatives of the United States.)

The International Foundry Dictionary Committee has made good progress and is trying hard to complete the dictionary within about a year.

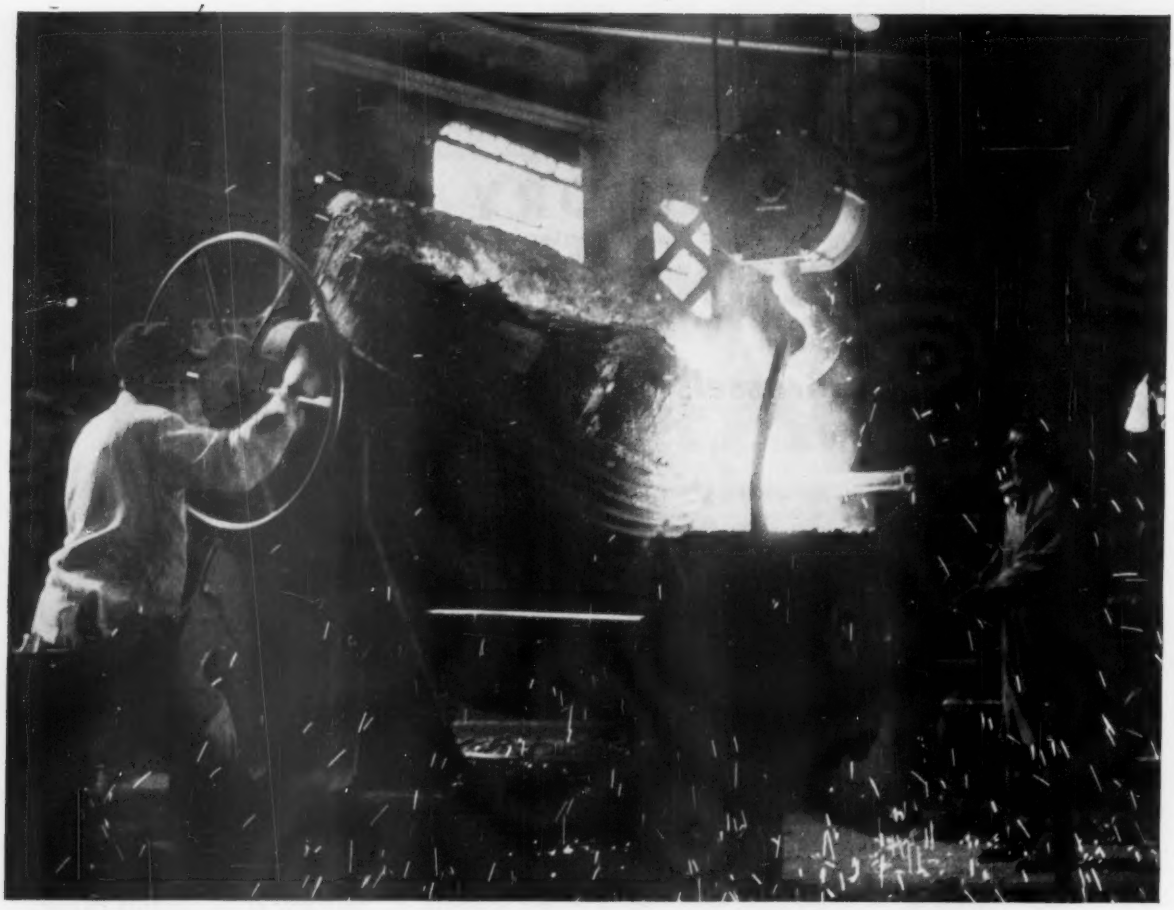
An interesting new development was the decision to set up working groups in which individual countries would study problems of special interest and might invite neighbor countries to participate. France already has volunteered to form a working group on properties of cast alloys, and Germany one on bonding materials, including bentonites.

At the same time as these events there was an extensive program of visits for the ladies, and delegates and ladies combined in various evening functions including the closing banquet, the dinner to the official delegates and an enchanting performance of the Salzburg Puppets.

Most delegates took the opportunity to pay several visits to the Brussels Exhibition, which was on such a scale that two or three weeks would have been more appropriate for detailed inspection. The exhibition naturally did not cater specially for foundry products, though there was an exhibition of interesting castings in the Belgian metallurgical section. One also encountered occasional examples of other castings, but it could not be said that the foundry industry made any great impact on the world of visitors.

A total of 37 papers were presented to the conference. It is not possible to do more than comment briefly on each one. The subject of "Man and Labour in the Foundry" was considered by H. Scholz (Germany) who studied the physical loads imposed on workers in industry during various operations. He indicated by a number of illustrations how efficiency can be strikingly improved and worker fatigue reduced by proper consideration and planning of many operations in the foundry. The paper concludes with examples of the effect of rest periods on labor efficiency.

**Production Trends** — A particu-



**Every inch a ladle...**

# "Teapot spout" pours clean without skimming!

A Chicago foundry distributes clean molten metal every time with this *Whiting Teapot Spout Ladle*. Easy to operate, there's no skimming required because floating slag forms a crust to keep heat *in* and temperature right for bottom pour. Easy to maintain, the simple spout arrangement is independent of bowl, can be relined without disturbing bowl proper!

*Whiting Ladles* of all types and sizes are designed to speed output, minimize labor and improve quality of foundry castings. Built to withstand the rigors of year in, year out service, they feature steel spouts, riveted or welded heads and specially designed bowl reinforcement.

**SEND FOR 36 PAGE BULLETIN FY-163-R**

. . . it details and describes *Whiting Ladles*, shows how accurate pouring, greater safety, easier control and longer life are built into eighteen different types! *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Ill.*

*Member of the Foundry Equipment Manufacturers Association.*

87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

**WHITING** FOUNDRY EQUIPMENT

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT



Circle 608 on Page 51

larly interesting paper by L. Villner (Sweden) dealt with the over-all volume of production in the iron foundry industry. Production figures of Sweden, West Germany, U.S.A., and Great Britain were compared and parallel trends were clearly detected. It was shown that the rate of growth of the iron foundry industry in all countries is less than that of industry in general. Among reasons for this slower advance are technical improvements leading to more accurate and, therefore, lighter castings which often are better designed and use superior materials. Improvements in the efficiency of the cast product, while they safeguard the future use of castings, often reduce the actual weight of castings employed.

Most serious competition from other methods of fabrication is from welding. Metal stampings are replacing castings in some industries, although in some countries cast kitchen ware has succeeded remarkably well in holding its own. Forgings are thought not to be a serious factor in competing with cast iron, and in Sweden at least the competition from plastics is felt to be exaggerated. It was interesting to note that the relative usage of malleable iron castings in the United States is considerably higher than in Western Europe.

**Research** — G. Blanc (France) from his experience as director of the Technical Foundry Center in Paris considered first the philosophy of research organizations, and then detailed recent major technical advances in many foundry fields from all over the world as examples of research applications. He next discussed the arrangement of research programs and collaboration between research institutes and industry and between corresponding bodies in other countries.

**Gases in Cast Iron**—Gases in cast iron was dealt with by B. Marincek and H. Feichtinger (Switzerland). They described the modified equipment they employed and quoted numerous examples of gas analyses on different materials carried out at different extraction temperatures. They laid particular stress on the sampling procedure and believe that the taking of a representative sample rapidly and safely is essential to secure consistent results.

**Gray Iron Quality**—In his paper, W. Patterson (Germany) attempts to establish some quantitative criteria for assessing the quality of gray cast iron. He points out that earlier workers have established a mathematical relationship in limited test piece sizes between the tensile strength and the carbon equivalent value. The tensile strength obtained from this formula may be regarded as the theoretical tensile strength.

According to the history of the cast iron, the theoretical strength may or may not differ from the actual measured strength and the ratio between the two tensile strengths is termed "Reifegrad." Literally the term means "ripeness value" which does not have the correct significance in English, and Prof. Patterson has agreed that it would be best translated by the term "degree of normality," a normal iron being one where the two tensile strengths are equal, i.e. a degree of normality of 100 per cent. Since the theoretical tensile strength is based on the carbon equivalent value, it is desirable to have a high degree of normality because this means that a given tensile strength value is achieved at a high carbon equivalent value, which in turn means freedom from many foundry troubles.

By similar processes the brinell hardness value can be mathematically related to the tensile strength, and from the consequent formula a theoretical hardness value can be calculated. If this is related to the measured hardness value, the relative hardness is obtained. In this case a low relative hardness is desirable since this means that for a given tensile strength the hardness of the iron is much less, with consequent production advantages. It is possible that an over-all quality factor may be provided by the ratio between degree of normality and relative hardness.

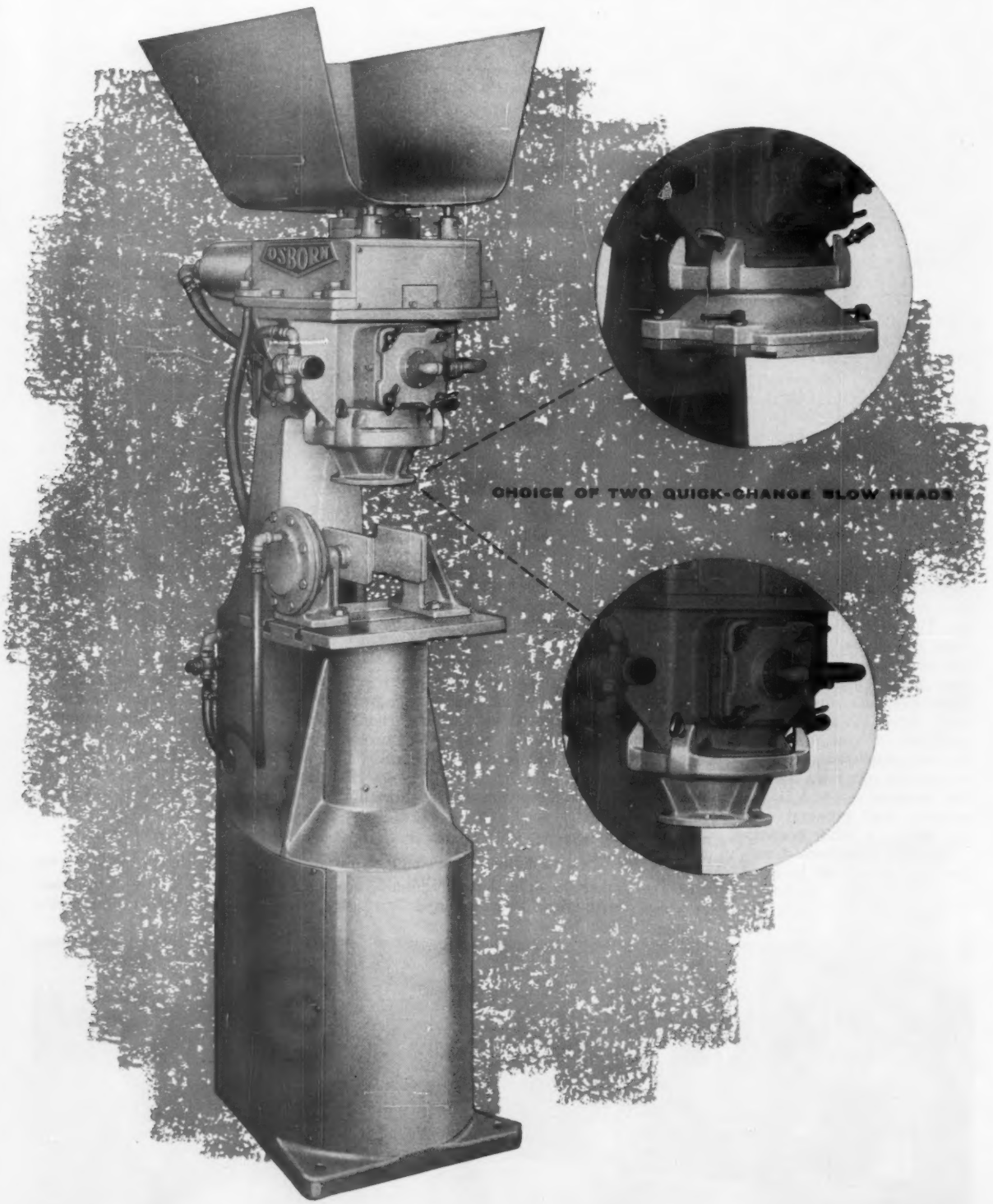
Using these basic concepts, Prof. Patterson studies the published results of many workers as well as figures of his own, and by use of the quality factors considers the effect of such foundry conditions as casting temperature, superheating temperature, furnace atmosphere, inoculation, wall thickness, alloy elements, form of graphite, and annealing heat treatments.

**Alloy Irons**—A. de Sy and J. van Eeghem (Belgium) reported on their studies to develop a nonmagnetic austenitic iron based on additions of nickel, copper, and manganese, which was clearly intended to result in a cheaper alloy than those normally used containing either nickel and manganese or nickel, copper, and chromium. The range of compositions arrived at contained from 2-5 per cent copper, 5-6 per cent manganese, and 5-7 per cent nickel.

Tensile strengths of these alloys were similar to those of existing alloys but slightly inferior in ductility and shock resistance. Attempts were also made to produce similar irons with spheroidal graphite. This proved to be quite successful on alloys containing 5 per cent copper,

The International Committee on Foundry Defects met during the Congress. Left to right, left foreground, are Prof. James Leach and Richard Deas, American members, and Dr. A. B. Everest, European AFS representative

# NEW from OSBORN....




MOLDING MACHINES • CORE BLOWERS • SHELL MOLDING MACHINES • BRUSHING MACHINES • INDUSTRIAL BRUSHES

MEMBER FEMA

Circle 712 on Page 51

# JET-CORE

SAND TO FINISHED CORE AUTOMATICALLY

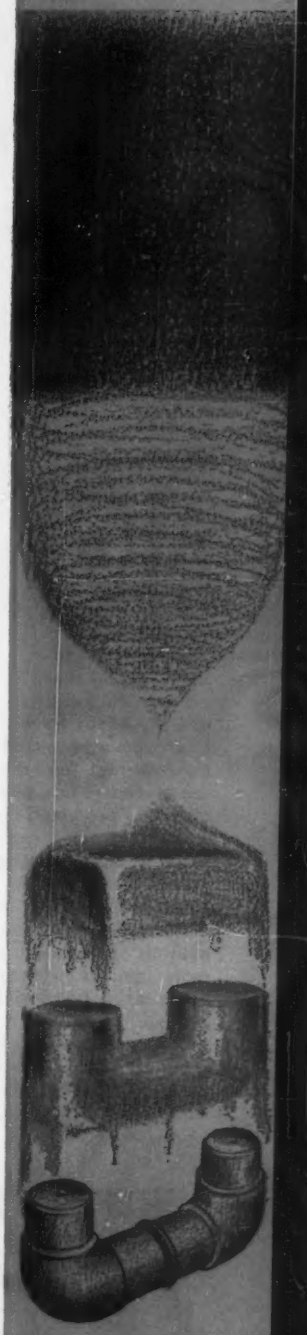
## AUTOMATIC CORE BLOWER

### for low-cost, high production of quality small cores

Newest equipment development in Osborn's famous line of foundry production machinery is the Osborn JET-CORE Automatic Core Blower.

Designed for use in production, semi-production or jobbing foundries, the JET-CORE produces quality cores at extremely low cost . . . automatically . . . at high production rates.

Write us for full details on the new JET-CORE and how it can help you trim costs and boost foundry profits. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



## OSBORN JET-CORE FEATURES

- Automatic, single push-button operation.
- High-speed machine cycle time.
- Improved jet action blow.
- Choice of quick-change blow heads speeds setup time—standard head with quick-change blow plate . . . funnel head for jet blow.
- Stationary head . . . no reservoir movement for filling.
- Core-Blower table adjusts and locks hydraulically.
- Unit is exceptionally compact.
- Designed to deliver highest quality cores faster . . . at low cost.

*leader in mechanization for the foundry* OSBORN®

# PYRO LANCE

**get below surface readings for greater accuracy**

Temperature readings of molten nonferrous metals are only accurate when taken below the surface, unaffected by dross and other surface conditions. That is why there is industry-wide acceptance of the Alnor Pyro Lance.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip. Enclosed couple is protected against flame, fumes and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

**PRECISION INSTRUMENTS FOR EVERY INDUSTRY**

*Circle 700 on Page 51*


5 per cent manganese and 6 per cent nickel, where there were marked improvements in tensile strength and in shock resistance but some tendency for the magnetic properties to deteriorate.

**Management Problems** — Two papers by French authors, M. Perry and D. Waeles, dealt with what were essentially management problems, the first particularly on the basis of the psychological and sociological factors involved in establishing proper human relationships in industry, and the second dealing with the necessity of industrial administrations to establish proper methods of professional training of the staff engaged in industry. The latter paper detailed the various types of training necessary and described the steps taken in France to satisfy the various training demands of industry.

**High-Strength Aluminum**—A different application of theory to practice was described by M. C. Flemings and H. F. Taylor (U.S.A.), who described the results of seven years research work at MIT in improving the mechanical properties of aluminum alloy castings, particularly the normal alloy containing 4.5 per cent copper. This paper showed how theoretical and laboratory investigations on castings indicated that microporosity and the presence of brittle intergranular compounds led to serious deterioration in mechanical properties. It was argued that suitable chilling techniques would eliminate both these types of defects, and attention was also given to methods of preventing the formation of columnar crystal grains and of large dendrites.

From this purely laboratory investigation practical methods of producing aircraft castings were worked out involving careful control of the melting and molding practice with proper gating systems and the application of planned chilling. On these intricate production castings startling results were achieved with tensile strength values 50-100 per cent higher and elongations as much as 700 per cent higher than those specified. It was particularly significant that these properties were reproduced and guaranteed within the castings themselves.

**Vacuum Melting**—The possibility of applying vacuum techniques in the foundry was studied by Z. Eminger and Z. Kletecka of the Lenin (originally Skoda) works, Czechoslovakia, using aluminum silicon alloys. After pointing out the theoretical benefits of complete degasification, three methods of approach are indicated—(1) complete melting and casting in vacuuo, which is applicable only in special cases, (2) normal melting and pouring followed by solidification under pressure in an autoclave, which is rather costly and clumsy, and (3) normal melting followed by vacuum treatment in a special vessel, and finally normal pouring. The third method is the one used by the authors.

The vacuum treatment may consist simply of placing the crucible of molten metal in a vacuum chamber, which tends to lead to violent boiling, or pouring through an orifice into the ladle placed in the vacuum chamber. Degasification of the metal stream follows efficiently and easily. Castings made by this method show practically no porosity, less nonmetallic inclusions, and fine grain size. Both in the as-cast state and the heat treated state the vacuum-treated alloy has 10 per cent higher tensile strength and improved ductility which amounts to about 50 per cent in the heat-treated condition.

**Aluminum Alloys**—Continuing a series of publications on the properties of aluminum casting alloys containing 5 to 12 per cent magnesium, L.G.J. Van Ewijk (Holland) compared the mechanical properties of these alloys and other conventional aluminum casting alloys incorporating copper and silicon. This comparison was made over a temperature range of −100 to 100° C, occasionally going as high as 200° C.

The broad conclusions are that the properties of the magnesium-containing alloys vary with temperature in the same sort of way as the other aluminum alloys. In general the magnesium alloys were influenced more by temperature changes than the other alloys, and this dependence on temperature was greater the higher the magnesium content.

Those alloys containing more than 9 per cent magnesium showed instability at slightly elevated temperatures and are clearly unsuitable for service applications much above room temperature. These differences were particularly marked in respect of shock resistance where, at room temperature and above, the magnesium alloys were enormously superior to the other alloys but deteriorated rapidly below freezing point. Even at −100° C they remained better than the other alloys because they had started from a much higher level. The alloy with 5.5 per cent magnesium was much more resistant to change in temperature and maintained excellent shock resistance

# $CO_2$ hardened cores and molds get extra refractory protection with

# MEXICAN VV FLAKE

To meet the growing demands of foundries which need a good mold and core wash well suited to the carbon dioxide mold-core hardening process—The United States Graphite Company has pioneered and developed MEXICAN® VV Flake ("volatile vehicle"). This new mold and core wash comes in paste form and is completely compatible with isopropyl alcohol, oleum spirits, kerosene, or similar agents. Mixed with isopropyl alcohol as its thinner, it can be easily "lit off" to promote faster drying. Suitable for application by spraying or dipping, MEXICAN VV Flake provides excellent protection and peel for molds and cores . . . bringing to foundries which utilize the $CO_2$ technique, a new high in production and casting quality; and greater refractory protection for molds and cores. Use of MEXICAN VV Flake with isopropyl alcohol improves the skin hardness and allows molds and cores to be stored for longer periods of time without deteriorating. Comes in 55 gallon drums.

***for further information on MEXICAN VV Flake or other quality MEXICAN products, write:*** 235

## THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

throughout the whole range tested.

**Magnesium Alloys**—Another paper dealing mainly with magnesium alloys considered the variables which influence mechanical properties. This was by J. W. Meier (Canada) and since it raised many important questions regarding the inspection of castings, was of interest to a much wider foundry circle than only producers of magnesium alloy castings. The paper considers such factors as variations in test bar size and preparation, molten metal factors, section size, composition and grain size. Particular attention was drawn to the close connection between casting quality and grain size.

The author suggests that when the design of a casting is being developed, destructive tests should be carried out to establish the strength properties in different parts of the casting but that once the design has been settled, acceptance of castings should be based on (1) melt quality tests, using separately cast test bars, (2) nondestructive casting quality tests such as x-ray, and (3) the checking of the grain size and structure of critical sections from a small number of production castings. Grain size determination on castings is much less expensive than actual tensile strength determinations.

**Grain Size of Gray Iron**—A mathematical study of the grain size of gray cast iron was made by J. S. Abcower (Holland) who concluded that the most important variable in determining characteristics of gray iron is the speed of solidification, which itself is affected by several foundry variables. Nevertheless, it is the single variable of the most general importance, and mathematical expressions were developed for determining the grain size and the size of the eutectic cells in relation to solidification speed.

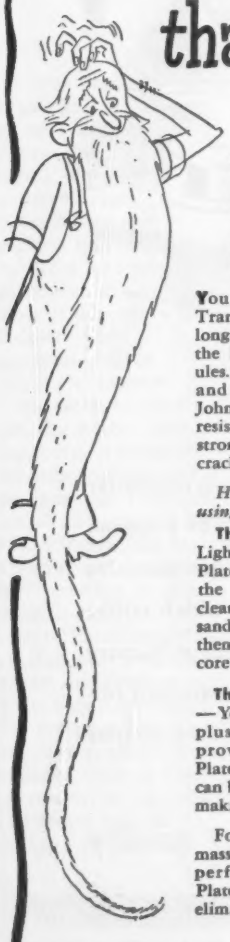
**Iron Feeders** — Another mathematical study was submitted by C. Trenckle (France), who demonstrated how to determine feeder sizes and shapes for practically all shapes and sizes of iron castings made in any type of sand. It considers ingate sections, runner sections, pressures, times of filling, speed of the molten metal, step gating, and other factors. Perhaps the most valuable part of this paper lies in the examples of calculations as applied to various types of castings in which 12 different sets of graphs are provided and three examples worked out in detail.

**Core Supports**—A group of three papers by Belgian authors—R. Namur, F. Kinet and R. Collette, F. Gaty and R. Namur—was introduced and summarized by H. Groutaers. These papers deal with different aspects of the general question of supporting cores in sand molds. The first paper deals with the calculation of lifting forces on the cope and on the cores, drawing attention to the importance of gas pressure; the second deals with chaplets and illustrates 56 different types with general consideration of their method of application and defects which could originate from them, while the third paper deals with the cold and hot strength of molding sands for coremaking and with the strength of chaplets.

These papers provided a great deal of information which cannot easily be summarized, but one or two general suggestions were made by H. Groutaers. He suggested that chaplets should generally have a diameter equal or superior to the height divided by 3, and that the thickness of the chaplet material should be the height divided by 30 with a minimum thickness of 0.5 mm.

*(To Be Concluded Next Month)*


# Looking for core plates that LAST LONGER?



## . . . then use TRANSITE CORE PLATES that stay on the job year in, year out

You can rely on durable Transite* Core Plates to give long-term service, even under the heaviest foundry schedules. Made of fibrous asbestos and cement, by a special Johns-Manville process, they resist shock and corrosion, are strong and durable, will not crack or break easily.

*Here are more reasons for using Transite Core Plates:*

**They speed production**—Light-weight Transite Core Plates are easier to handle on the job. They're easier to clean, too . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

**They maintain accuracy**—Years of foundry service, plus exhaustive tests, have proven that Transite Core Plates do not warp readily . . . can be used for precision core making indefinitely.

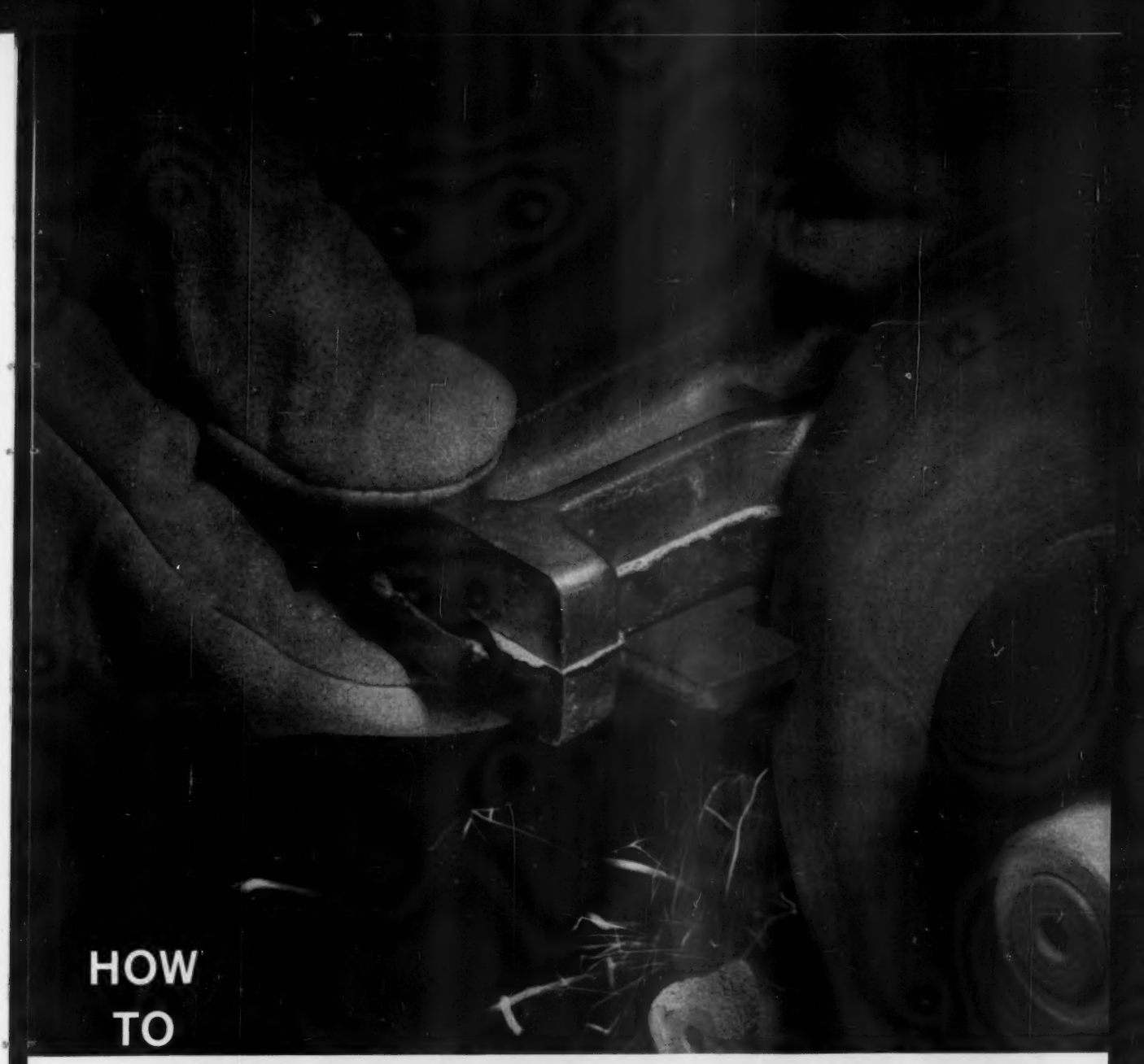
For core plates of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 14, New York 16, N.Y.

JM PRODUCTS

*Reg. U. S. Pat. Off.

**Johns-Manville TRANSITE CORE PLATES**

**Made of Asbestos**




# AVOID CASTING FINS IN SHELL MOLDING

Fins are for fish, not for castings. Here are five suggestions that will help you avoid th

**1. Improve bonding practice.** Position second mold half before bonding adhesive begins to cure. If shell is too hot, lower pattern temperature or allow shell to cool before applying bonding resin.

**2. Clean mold surfaces before assembly.** Loose sand or other foreign materials won't let shell halves press firmly together.

**3. Clean pattern; avoid lubricant buildup.** Any buildup on the pattern creates a cavity with respect to the mold. Likewise, pattern depressions create high spots that prevent flat mating of mold halves.

**4. Check for warped shells.** These seldom fit together perfectly even when bonded.

**5. Resin should be fully cured.** For a perfectly flat shell there must be no rubberiness at ejection. Otherwise, shell mating must be accomplished quickly.

Another helpful hint for better shell molding: use G-E shell resins. You can depend on them—and on the practical experience of G.E.'s technical service specialists. Some of this experience has been summarized in a brochure, "59 Answers to Your Shell Molding Problems." For your copy write General Electric Company, Section F 58, Chemical Materials Dept., Pittsfield, Mass.

*Progress In Phenolics*

**GENERAL ELECTRIC**

Circle 702 on Page 51

# Industry Briefs

**HARTZELL MFG. CO.**, 2516 Wabash Ave., St. Paul, Minn., has been formed to produce commercial zinc and aluminum diecastings. It also will machine and finish aluminum diecastings and build aluminum and zinc diecast molds. The company combines the assets, personnel, and facilities of Lloyd Products Inc., Mitee Mfg. Co., and Production Engineering Co., all of which were in St. Paul, and will employ more than 100 persons. Officers include Thomas S. Hartzell, president; John T. Walker, executive vice president and general manager; Murray J. Laub, vice president and director of sales; and James R. Hartzell, secretary.

**Algem Aluminum Foundry**, Cleveland, suffered fire damage estimated at $20,000 to $25,000 on Nov. 6. Cause of the fire was not known immediately.

**Carborundum Co.**, Niagara Falls, N. Y., has begun a million-dollar expansion and modernization program at its Refractories Div. plant in Keasbey, N. J. The step is the first in an extensive over-all plan. It calls for erecting new buildings, realigning production facilities, and installing new equipment.

**James B. Clow & Sons Inc.**, Chicago, has opened a $6½ million, 100,000-sq-ft plant at Bensenville, Ill., to produce cast iron pressure pipe of 6 to 16-in. diam, in 18-ft lengths, by the metal mold process. Clow also produces pipe at plants in Coshocton, Ohio, and Birmingham. Subsidiaries manufacture hydrants and valves at Waterford, N. Y., and Oskaloosa, Iowa.

**Wilson Die Casting Corp.**, Route 3, Box 146, Racine, Wis., has been incorporated with 2500 shares of stock at $10. Registered agent is Harold D. Wilson, same address.

**Consolidated Foundries & Mfg. Corp.**, Chicago, has formed a closer working relationship between two of its operating divisions—Casting Engineers Inc., Chicago, and Misco Precision Casting Co., Whitehall, Mich. Casting Engineers will devote its full facilities to the production of industrial-type components, and Misco will broaden its present coverage of investment cast parts for the aviation industry.

**Frederic B. Stevens Inc.**, Detroit, has added Hydra-Blast supplies and equipment to its metal finishing line. A manufacturing division of Automation Services Inc., Detroit, Hydra-Blast produces a wet scaling process in which water and abrasives are ejected from a blast gun by compressed air.

**Treu Corp.**, iron and brass foundry, 276 Fifth Ave., New York 1, N. Y., has been incorporated with 200 shares of capital stock of no par value. Directors are Vincent E. Cucci, Israel W. Tannenbaum, and Marilyn Berger, all of 276 Fifth Ave.

**Acheson Colloids Co.**, Port Huron, Mich., is observing its 50th anniversary this year. It was formed in Niagara Falls, N. Y., in 1908, as the Acheson Oildag Co., by Dr. Edward G. Acheson. Dr. Acheson discovered silicon carbide, which he called Carborundum, and developed electric furnace or synthetic graphite and methods of converting it into colloidal dispersions. Acheson Colloids currently is producing more than 40 such dispersions.

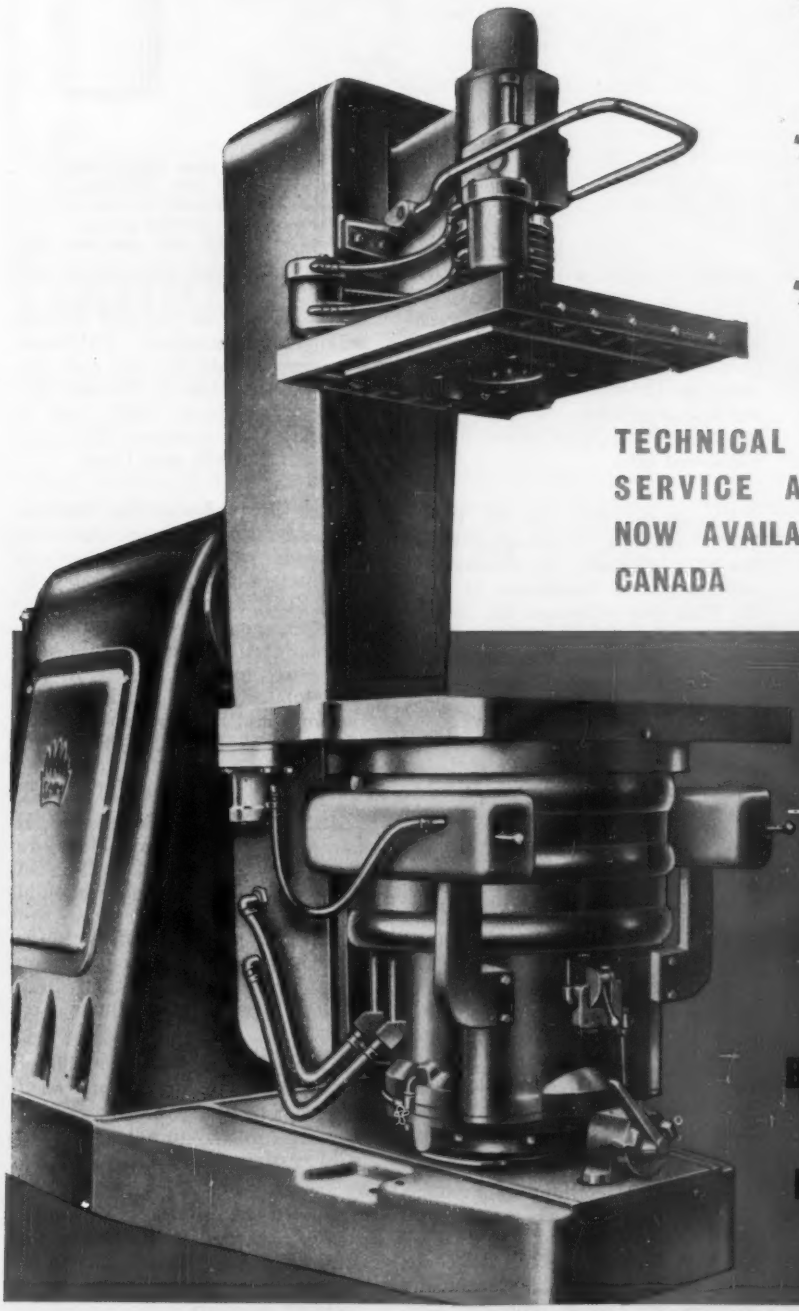
**Irwin-Sensenich Corp.** is the new name of the former Irwin Foundry & Mine Car Co., Irwin, Pa. Diversification of the company's operations in recent years prompted the change. No other changes are involved.

**Sidney Brass & Aluminum Foundry Co.**, Sidney, Ohio, was destroyed by fire on the night of Oct. 19. Cause of the blaze was not determined.

**Haynes Stellite Co.**, a division of Union Carbide Corp., Kokomo, Ind., has been licensed to produce two alloys to be designated alloys 713-C and 500. Alloy 713-C is a nickel-base investment casting alloy developed by International Nickel

**WASHINGTON TALKS:** A delegation of officers and directors of the Non-Ferrous Founders' Society met with officials of the Business & Defense Services Administration, U. S. Dept. of Commerce, in Washington recently. The NFFS delegation conferred with H. Herbert Hughes, deputy administrator, BDSA; William A. Meissner Jr., director, Copper Div.; and A. A. Snow, director, Aluminum & Magnesium Div. Major topics of discussion were the National Defense Executive Reserve, stockpiling of metals and minerals by the government, and the copper discussions held recently in London, England

# BT TURNOVER



* PRESS-BUTTON OPERATION
* FAST PRODUCTION
* AUTOMATIC MOLD REMOVAL

TECHNICAL REPRESENTATION, SERVICE AND ALL SPARES NOW AVAILABLE IN U.S.A. AND CANADA

*write today*

*for full particulars of these and other models*

BRITISH MOULDING MACHINE CO LTD
FAVERSHAM KENT
ENGLAND

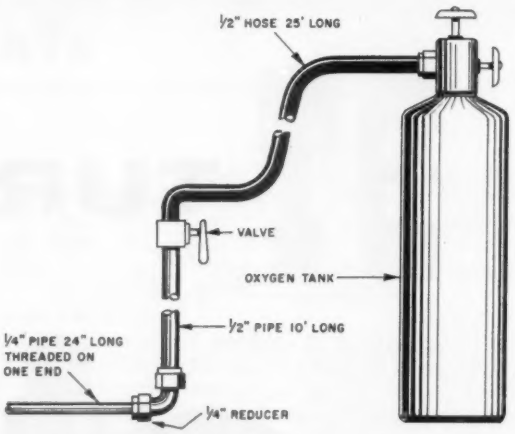
P231C

## HOW TO DO IT

# Easily-Made Oxygen Lance Frees Cupola Tap Hole in Emergency

By CHARLES E. BALL
Noble & Wood Machine Co.
Hoosick Falls, N. Y.

EMERGENCY conditions created when a cupola tap hole becomes plugged or restricted with solidified iron can be overcome by applying a jet of oxygen to burn away the iron. The simple device illustrated here offers a comparatively safe means of directing the oxygen against the obstructing iron. It consists of sections of pipe, fittings, valve, and hose attached to an oxygen tank. When kept near the cupola it is ready for immediate use.




**Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea**

Co. and marketed by Inco as Inconel 713-C alloy. Alloy 500 was developed by Utica Metals Div., Kelsey-Hayes Co., primarily for use as a high-temperature material, and is marketed by that company as Udimet 500 alloy.

**Metal Treating Institute** reports that September billing of members totaled $2,457,100, or 11.1 per cent less than in the same month last year. Through September, MTI 1958 billings are down 24.5 per cent from the 1957 figure.

**Titeflex Inc.**, Springfield, Mass., recently opened its first branch plant, Titeflex-Pacific Div., 2328 Broadway, Santa Monica, Calif. The company produces flexible metal and Teflon hose, couplings, electrical connectors, and other components.

**V. B. Machine Corp.**, foundry and machine shop, 738-750 Grand St., Brooklyn, N. Y., has been granted a charter of incorporation listing capital stock including 1000 shares of preferred at $100 par value and 1 million shares of common at $1 par value. Directors are P. E. Gilbert Jr., Robert E. Young, and Daniel Mandel, all of 52 Wall St., New York 5, N. Y.

**Alloy Precision Castings Co.**, 3855 W. 150th St., Cleveland, a subsidiary of Mercast Mfg. Corp., LaVerne, Calif., has ceased production. Customer orders for investment castings which the foundry produced will be met by Mercast's plant in LaVerne if that arrangement is acceptable. Mercast plans to maintain a sales office in the Cleveland area.

**Refractories Div., H. K. Porter Co.**, Pittsburgh, is enlarging facilities at its Ottawa, Ill., Works and will operate a warehouse at 4425 W. Fifth Ave., Chicago, Ill., to provide service to the Chicago-Gary area. A. M. Lieser, Charles Singleton, and Chester J. Simmons have been added to the Chicago sales staff.

**Outboard Marine Corp.**, Waukegan, Ill., has been licensed to use the Shaw investment casting process in the manufacture of Johnson, Evinrude, and Gale Buccaneer outboard motors and of its other products.

**George L. Sall Co.**, Philadelphia smelter of nonferrous metals, has been named East Coast distributor for Kaiser Aluminum & Chemical Co. Sall Co. will carry the complete line of Kaiser prime aluminum ingots.

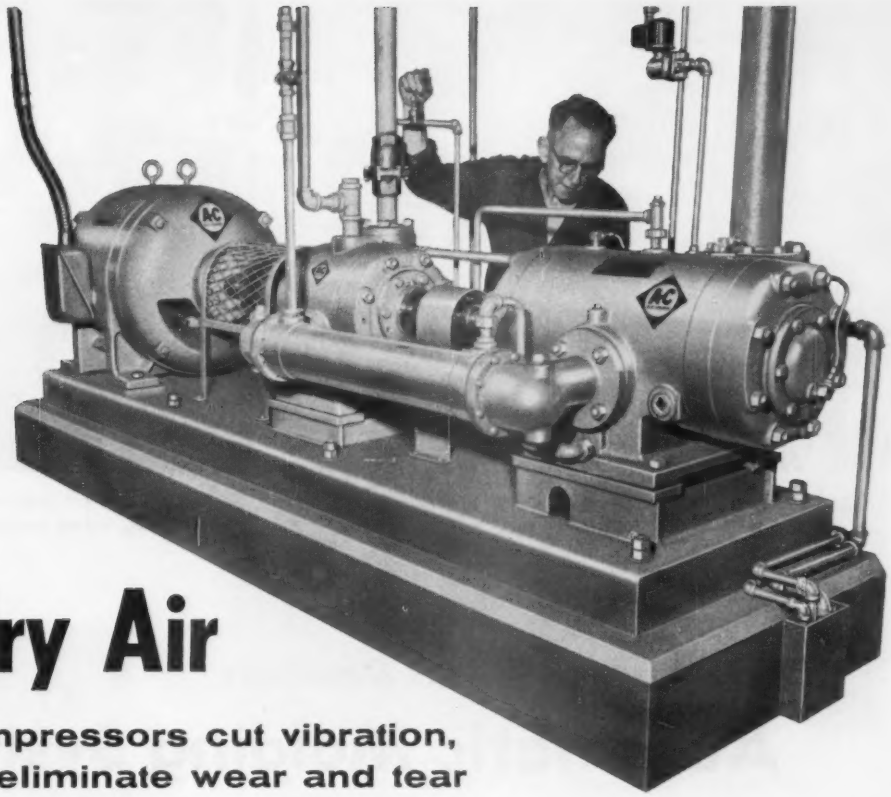
**American Metallurgical Products Co.**, Pittsburgh, has named two West Coast distributors of the rare earth metal alloys, silicon carbide, and other materials the company supplies the metals industries. Gordon Sondraker & Co., Los Angeles, will cover southern California, southern Nevada, Arizona, and New Mexico. Industrial & Foundry Supply Co., Oakland, Calif., will be distributor for northern California, northern Nevada, and Utah.

**American Railway Car Institute** and the **Association of American Railroads** report that delivery of new freight cars in September totaled 2131, compared with 8450 in the same month last year. September orders for new freight cars amounted to 1582. A year ago, they totaled 3162. Backlog of cars on order and undelivered on Oct. 1 was 24,982. It was 71,981 a year ago.

**Armour Research Foundation, Illinois Institute of Technology**, recently dedicated a $1.2 million addition to its Metals Research Building. The four-story, 68,000-sq-ft building more than doubles the department's space for metals projects. The new building is the 24th in an over-all expansion program.

**Cooper Alloy Corp.**, Hillside, N. J., has appointed Norwood & Krauss, 5-254 General Motors Bldg., Detroit 2, Mich., to sell its stainless steel castings in Michigan.

**Ampco Metal Inc.**, Milwaukee, has named the A. E. Dailey Co., 1507 16th Ave., Moline, Ill., to distribute its complete line of bronze welding products.

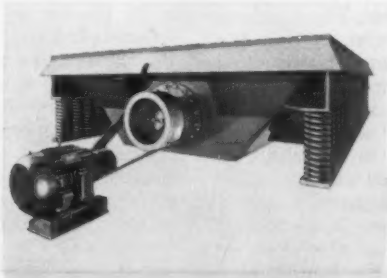


# For Foundry Air

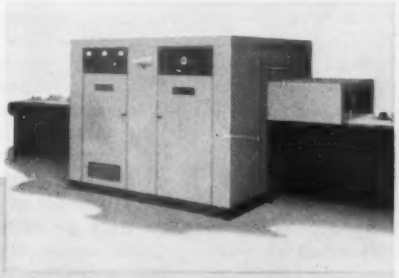
## Ro-Flo compressors cut vibration, eliminate wear and tear

Rotary motion of Allis-Chalmers compressors practically eliminates vibration and shock. There are no reciprocating parts — no pistons, valves or connecting rods to cause trouble. These factors reduce maintenance to a minimum. Another important advantage is the constant efficiency inherent in rotary design. Centrifugal force holds vanes tightly against cylinder wall under all conditions. Smooth, vibrationless operation eliminates need for heavy, costly foundations.

**Many types and sizes** — Single-stage units for pressures to 50 pounds gauge, and volumes from 42 to 3245 cfm. Two-stage units for 250 to 1800 cfm at pressures from 60 to 125 pounds gauge. For details ask your A-C man for Bulletin 16B8244 (two-stage) and Bulletin 16B8126 (single-stage). Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.



***Foundromatic* shakeout.** For fast knockout of heaviest castings and flasks. Rated capacity of *Foundromatic* shakeout is over twice its weight. Bulletin 07B6365B gives all the details.



***Foundromatic* Dielectric Sand Core Oven.** There are 14 distinct advantages in using this fast, modern method of core baking—and each will save you money. Bulletin 15B7306D gives the complete story.

*Ro-Flo* and *Foundromatic* are Allis-Chalmers trademarks.

**ALLIS-CHALMERS**

A-5742



Circle 705 on Page 51

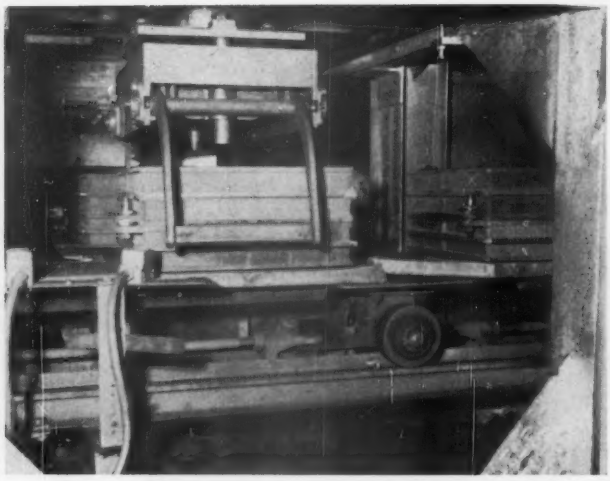


Fig. 1—Mold pick-up device at shakeout about to remove a mold from the conveyor

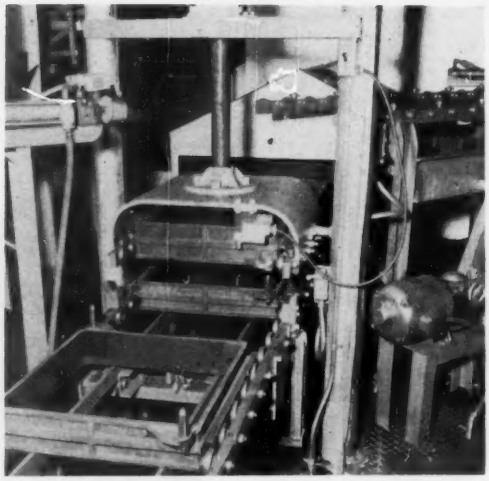


Fig. 2—Pick-off unit removes cope flask from the drag, raises and turns it 45 degrees

## *Brillion Iron Works Develops*

# Automatic Molding System

By **EDWIN BREMER**
*Metallurgical Editor*

MAINTENANCE of a strong competitive position in any industry is accomplished only by a constant search for better ways of producing goods which can be sold at a reasonable profit.

One foundry following that procedure is the Brillion Iron Works Inc., Brillion, Wis., which recently placed in operation an automatic molding system to produce four complete molds a minute with a maximum of five men. This development was engineered by the firm after considerable discussion and through the combined efforts of all department heads. Design and construction of the unit required nearly a year.

All equipment, exclusive of part of the mold cooling line and sand preparation system, occupies an area about 50 x 60 ft. It includes two blow-squeeze molding units made by Demmler Mfg. Co., Kewanee, Ill., with connecting wheel-type flask and mold conveyors, car type mold conveyor, mold closing unit, and shakeout unit. The compact arrangement required some ingenious engineering for moving flasks and molds from one location to another in regular sequence automatically. Flasks are 18 x 18 in. with a 4 in. drag and 5-in. cope.

**How It Operates**—For clarity in description of the operation, the starting point will be at the mold knockout or shakeout, Fig. 1, where the mold is lifted from the conveyor car by a pneumatcially operated clamp. This device is mounted on overhead rails and moves back and forth a distance of about 3 ft from the conveyor line to the shakeout screen. It is actuated and controlled by a number of electrically operated trips or switches. One located at the outer edge of the conveyor line is tripped by the leading edge of the mold, causing the clamps to close and grip the mold.

As soon as that is accomplished, the mold automatically is raised approximately 1 in. above the car, horizontally rotated 90 degrees counter-clockwise, and moved over the shakeout screen. This rotation is necessary to line up the projecting rails or flanges on the sides of the flasks parallel to the wheels on the conveyor on which it later will move. The mold then is lowered onto the conveyor, and the clamps open.

The clamping device then automatically moves back over the car conveyor and rotates clockwise to its initial position. A punch located in the top of the unit descends on the sand face of the mold over the shakeout to force the sand and casting out onto the shakeout screen, where the sand and castings are separated. Castings are discharged onto a short oscilating conveyor and then onto an apron conveyor on which they are elevated above the floor level into an adjoining area where they are sprued, sorted, and placed in tote boxes. Sand falls onto a conveyor belt system which transports it about 150 ft to elevated storage hopper above the sand muller in another building.

**Flask Separator**—The flasks move about 12 ft to the flask separating unit, Fig. 2. This unit is comprised of a U-shaped, curved plate containing sections of wheel conveyors and is attached to a pneumatic hoist. The flasks move into the separating unit and trip an electric

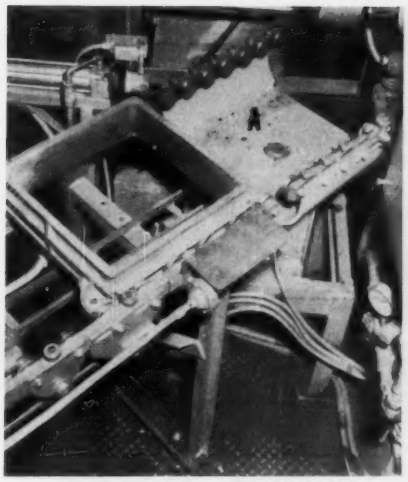



Fig. 3—Device *A* is flask turning unit and *B* a pneumatic ram

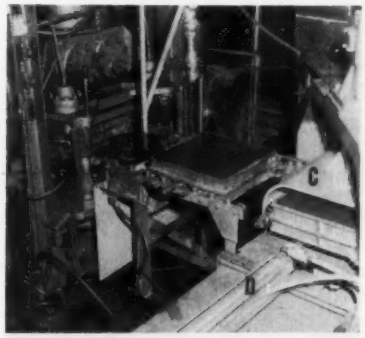



Fig. 4—Mold in turning unit *C* is pushed along by a pneumatic ram *D*

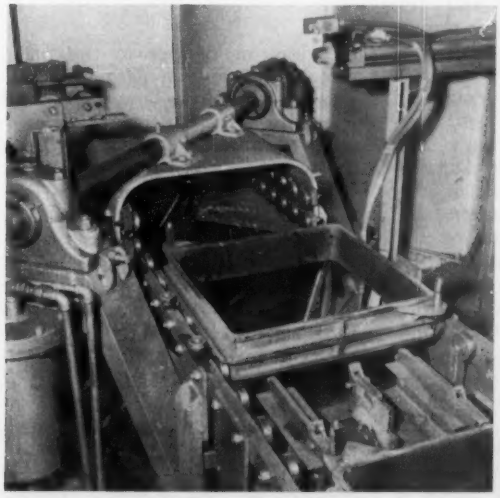


Fig. 5—Drag flask rolled over by the transfer unit is pushed onto another conveyor

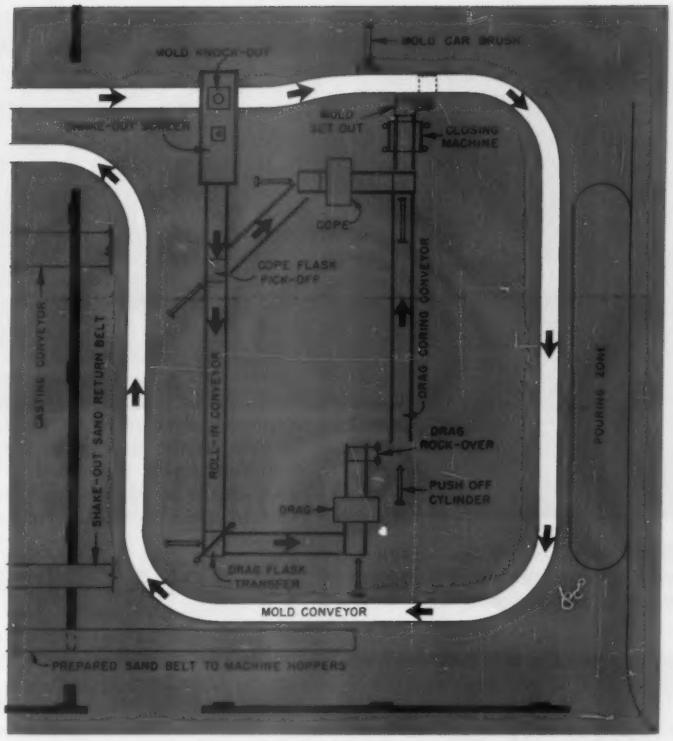



Fig. 6—Plan view of the new automatic molding system which, compactly arranged, occupies an area of about 3000 sq ft

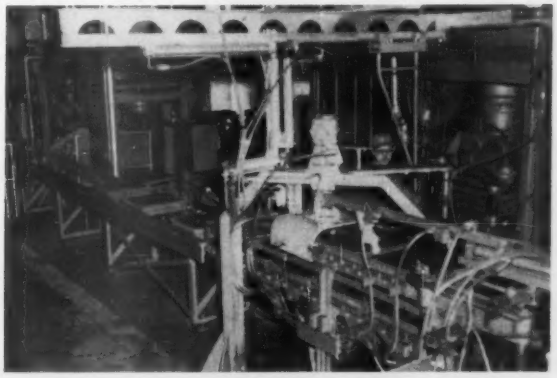
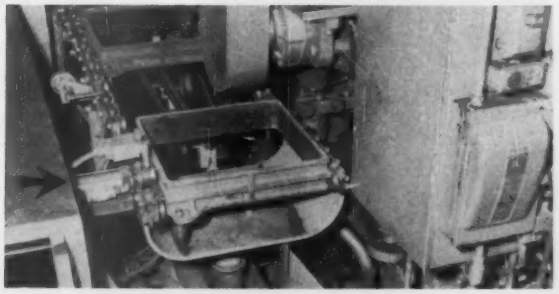


Fig. 7—View along the front of the system showing arrangement of some of the equipment

Fig. 8—Flask is turned 90 degrees and then pushed by the ram (arrow) into the molding unit



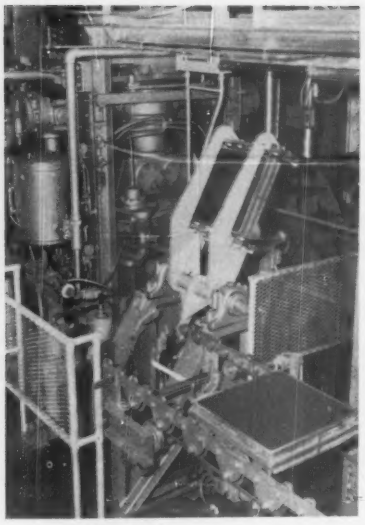


Fig. 9—Drag molds are rocked over to line up with the conveyor in the foreground

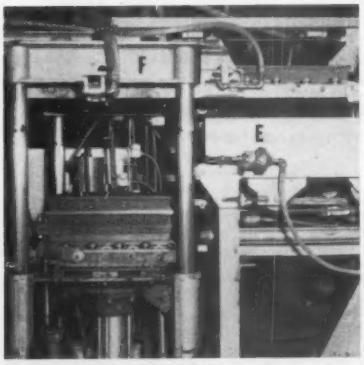



Fig. 10—Mold halves are closed automatically on this machine

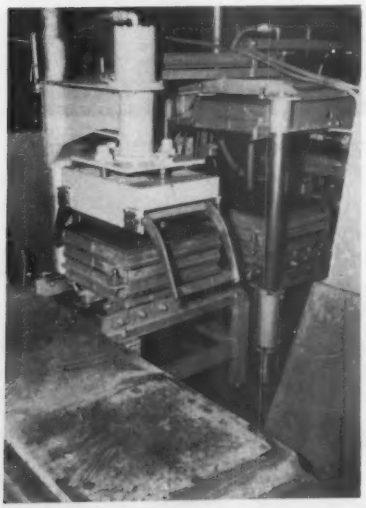


Fig. 11—This machine picks up mold and places it on conveyor

switch which actuates the hoist to raise the cope flasks about 2 ft. A cam on the guide rod rotates the unit about 45 degrees as it is raised.

At that point another switch actuates the pneumatic ram indicated by the arrow in the upper left of Fig. 2. This ram pushes the flask onto a driven wheel conveyor which transports it to the cope molding unit. The flask separating unit then goes through a reverse cycle and returns to its original position.

The cope flask is moved about 10 ft and rolls onto the curved plate unit containing sections of wheel conveyors designated *A* in Fig. 3. As soon as the flask is in position, it automatically is rotated 45 degrees clockwise and is held in this position until the following cycle is completed.

After the mold is blown, squeezed and drawn, the ram *B* is actuated. This pushes the empty flask into the blow-squeeze molding unit and pushes the completed mold out of the machine onto a short length of wheel conveyor where it is blown off. It is then moved into a curved plate device which rotates it 90 degrees counter-clockwise into the position shown at *C* in Fig. 4. The pneumatic ram *D* then is actuated to push the mold onto the upper portion of a double-deck wheel conveyor. After the mold is pushed out, the rotating device automatically returns to its original position to receive another mold. Succeeding molds advance the first mold to the closing unit at the extreme right in Fig. 7 which will be described later.

**Pneumatic Operation**—Returning to the mold separating unit described earlier, the drag flask shown in the foreground in Fig. 2 is transported by pneumatically operated push rods on the wheel conveyor about 25 ft to the rollover unit shown in Fig. 5. This unit is a curved plate device similar to others mentioned earlier except that it contains double-wheel conveyor sections. The rails or flanges on the sides of the flask enter between the two rows of wheels which hold it in position as the unit is rolled over.

The unit is attached to a shaft mounted at an angle of 45 degrees to both the wheel conveyor from which the flask enters and that on which it leaves. The exit conveyor is 12 in. higher than the entrance conveyor, and the center of rotation of the flask turnover device is midway between, so that in addition to turning the flasks over, the unit rotates it 90 degrees and then raises it from one level to another.

When the turnover device is rolled over parallel to the exit conveyor, the pneumatically operated ram at its upper right, Fig. 5, is actuated and pushes the drag onto the conveyor. This conveyor is driven and transports the flask about 13 ft onto the curved plate device shown in the center foreground of Fig. 8 which rotates it 90 degrees counter-clockwise in a horizontal plane. Then a pneumatic ram indicated by the arrow at the left is actuated and pushes the flask into the blow-squeeze machine at the right at the same time that it ejects the finished mold.

After the mold is made, it is ejected over a short section of wheel conveyor onto the mold rockover device shown in the center of Fig. 9 at about its quarter-cycle positions. The rockover unit vertically swings

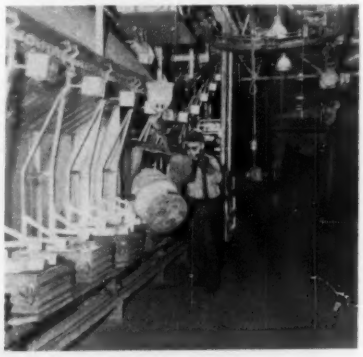
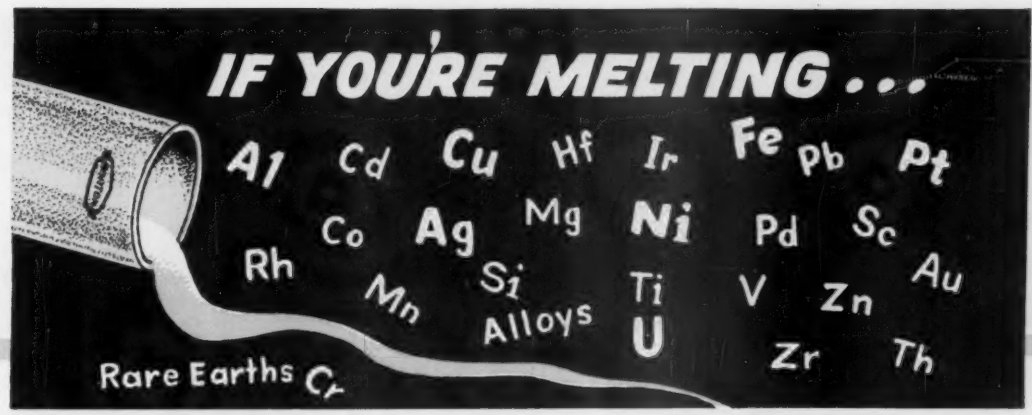


Fig. 12—Weights automatically are set on the molds as they move along the pouring line

the drag mold over to the main wheel type conveyor parallel to and about 4 ft from the conveyor at the machine. At that point a pneumatic ram pushes the mold from the rollover onto the main conveyor, which is a driven wheel type. Core setting takes place in this area when it is required.

The drag mold is transported on the conveyor for a distance of about 27 ft to the mold closing device shown at the left in Fig. 10 and at the right in Fig. 11. This unit consists of a table or platen which is moved vertically a distance of 20 in. by a pneumatically operated ram controlled by a number of electrical trips or switches. The table contains sections of wheel conveyors which permit the mold sections to be rolled on and off.

**Closing the Mold**—In operation




# Norton crucibles, available in many materials, meet a wide range of needs

## HEAVY WALL CRUCIBLES

| Furnace Sizes in Pounds | Outside Diameters | Wall Thicknesses | Over-All Heights |
|---|---|---|---|
| ½ to 300 | 1⅛" to 12¼" | ⅛" to ⅝" | 3½" to 16½" |

*Materials Available*

| | | | | | |
|---|---|---|---|---|---|
| **ALUNDUM*** | "A" 99% Alumina | All Sizes Shown | **ZIRCONIA** | "H" Fused Stabilized Zirconia | All Sizes Shown |
| **CRYSTOLON*** | "G" First Quality Silicon Carbide | All Sizes Shown | **THORIA** | | ½ to 50 lbs. |
| **CRYSTOLON** | "N" Nitride Bonded Silicon Carbide | All Sizes Shown | **URANIA** | | ½ to 50 lbs. |
| **MAGNORITE*** | "K" 97% Fused Magnesia | All Sizes Shown | | | |

## LIGHT WALL CRUCIBLES

| Furnace Sizes in Pounds | Outside Diameters | Wall Thicknesses | Over-All Heights |
|---|---|---|---|
| ½ to 50 | 1 3/32" to 5 13/16" | 3/32" to 5/32" | 3½" to 10 11/16" |

*Materials Available*

| | | | | | |
|---|---|---|---|---|---|
| **ALUNDUM** | "A" 99% Alumina | ½ to 50 lbs. | **ZIRCONIA** | "H" Fused Stabilized Zirconia | ½ to 50 lbs. |
| **MAGNORITE** | "M" 99% Fused Magnesia | ½ to 50 lbs. | **THORIA** | | ½ to 17 lbs. |

Norton crucibles are *engineered and prescribed* for a long list of metal melting operations. Available in a wide range of materials, sizes and types — as shown in the tables — they provide long, trouble-free service, protect your product purity and meet specific melting requirements.

Norton heavy wall crucibles, exceptionally strong and dense, are used for most induction furnace melting jobs. Thin wall crucibles, generally of lower porosity, are particularly suited for special and nuclear metallurgical processes. Their fine, smooth surface is particularly valuable for protecting high purity metals from refractory inclusions.

It will pay you to get further facts on this complete line of crucibles. For exact recommendations and all necessary details, contact your Norton Representative. Or write for new catalog, *"Norton Refractory Crucibles,"* to NORTON COMPANY, 311 New Bond Street, Worcester 6, Mass.

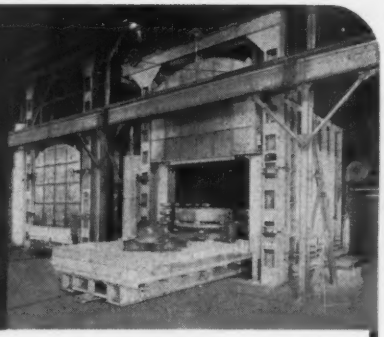
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
REFRACTORIES
*Engineered . . . Rx . . . Prescribed*

**Making better products . . . to make your products better**

**NORTON PRODUCTS** Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

**DFC**
**CAR BOTTOM FURNACES ARE ENGINEERED FOR BETTER SERVICE**



- External Tube-Type Flues:
  - Positive Furnace Pressure
  - Reduced Maintenance Cost
  - Greater Efficiency
- Chain & Sprocket or Rack & Pinion Car Mover
- Zoned Heat Chamber Gas, Oil or Dual-Fuel
- Temperature Range 400 to 2,000 F. if Desired
- Temperature Control Designed for All Foundry Heat Treatments: Ductile Iron, Steel Castings, etc.
- Utilizing Engineered Refractory Applications

*Ask your Foundry Supplier about DFC Non-Ferrous Melting Furnaces: Crucible, Pot or Reverbratory.*

DFC
**THE DENVER FIRE CLAY COMPANY**
3033 BLAKE STREET DENVER, COLO.
DENVER • SALT LAKE CITY • EL PASO

Circle 707 on Page 51

***Haul Castings the Economical Sterling Way!***

These all-steel, heavy duty trucks come in handy for hauling castings to and from cleaning room. With roller bearing wheels and ball bearing swivel casters, they glide along smoothly, maneuver easily. Save both time and labor. Capacity 2,000 lbs. Sturdy, reinforced welded construction. Write for literature.

**STERLING NATIONAL INDUSTRIES, Inc., Milwaukee 14, Wis., U. S. A.**
Founded 1904 as Sterling Wheelbarrow Company

**Sterling**
**FOUNDRY EQUIPMENT**

A-8530-1⅓R


the ram is actuated and moves the platen upward 12 in. until it is parallel with the conveyor at the right, *E* in Fig. 10, which contains the drag molds. Then a mold is pushed automatically onto the platen by a pneumatically operated ram. At the same time, a cope mold on the wheel conveyor just above is pulled automatically into the head of the machine *F* by another ram. As soon as the drag mold is in position, the platen and mold are moved up automatically a distance of 8 in. This action closes the drag against the cope.

On completion of the closure, the wheel conveyor sections in the head automatically are drawn away from the flask flanges so that the flask is free to move. The platen containing the complete mold then automatically moves down to its original position, as shown in Fig. 10. Then the mold is pushed from the machine onto a short section of wheel conveyor adjacent to it, as shown in the center of Fig. 11. There it is picked up by the pneumatically operated clamping device, raised a few inches and swung clockwise over the mold conveyor car shown at the left foreground. The mold is deposited about 6 in. from the front end of the car. The unit returns automatically to its original position, picks up another mold and deposits it about 6 in. from the first mold—the mold conveyor having moved automatically that distance during the sequence of operation.

The molds on the car then are transported about 10 ft to the pouring zone, Fig. 12, where weights suspended from an overhead chain system automatically are set on the molds. The molds are poured in front of an exhaust hood 30 ft long, and then enter the cooling tunnel

"I told you the metal was too cold"

*At Grinnell, molten iron is poured from air furnaces 16 hours a day (above) to produce over 2,000 different types and sizes of castings like those shown at right.*

# Grinnell uses HANNA SILVERY at their Columbia, Pa., plant to help maintain close silicon control

Grinnell Corporation is nationally known for its automatic sprinkler systems—a line relied on for dependable fire protection by thousands of American businesses. For these systems, and for its piping supply sales throughout the country, Grinnell at its Columbia, Pa., plant annually produces over 100 million malleable iron castings of uniform quality and dependability—pipe fittings, pipe hangers and supports from $\frac{1}{8}$" I.D. elbows to 6" I.D. tees.

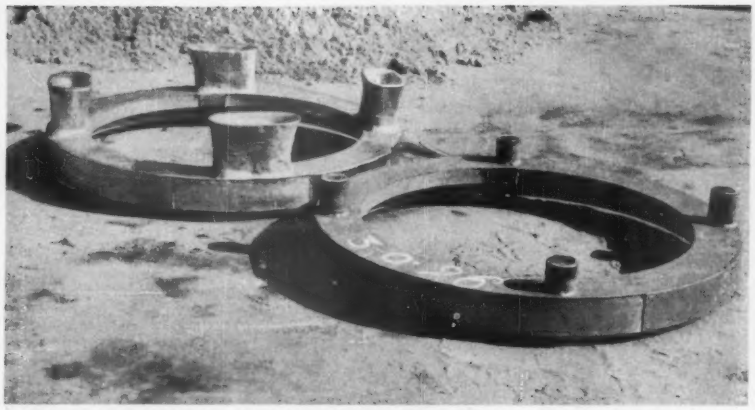
Every one of more than 2,000 patterns, many of them intricate, is cast from the same mixture. An all-important part of this mixture is Hanna Silvery Pig Iron. Grinnell metallurgists have found that Hanna Silvery, with its dependable analysis, gives them the silicon control so essential to the uniform qualities required in sprinkler systems and pipe fittings.

In addition to Silvery, Hanna produces all regular grades of pig iron, including HannaTite, a specially controlled close-grain iron. All are available in the popular 38-pound pig and the smaller HannaTen ingot.

Ask your Hanna representative how he can help solve your pig iron problems. He is an expert and as close as your telephone.

**THE HANNA FURNACE CORPORATION**
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

Circle 709 on Page 51



*here's real proof that*

**Foseco® FEEDEX®**

*can increase casting yields by 50%*

Residual risers on the casting at left are 9" x 4½" and weigh 170 pounds. Risers on the casting at right are 2½" in diameter and weigh 15 pounds. The casting weighs 347 pounds . . . the difference in riser size means the difference between 67% and 96% in casting yield . . . and Foseco FEEDEX made it possible.

FEEDEX is an exothermic anti-piping compound which can be molded to form sleeves or other shapes for application at any position in the mold. Grades for all types of metals are available. Prefabricated FEEDEX Sleeves can also be supplied in a wide range of standard sizes.

Other Foseco exothermic compounds include two high heat producing and insulating hot topping compounds . . . FERRUX for iron and steel and FEEDOL for aluminum and copper based alloys.

**FEEDEX, FERRUX and FEEDOL increase casting efficiency by . . .**

- eliminating shrinkage
- permitting substantial reduction in riser size so that more castings may be produced from each heat
- reducing cleaning costs
- keeping feed metal molten longer
- aiding directional solidification
- reducing scrap

*Write for your free copies of leaflets showing in detail why and how you can increase casting efficiency by using Foseco FEEDEX, FERRUX and FEEDOL.*

FOUNDRY SERVICES, INC.
2000 BRUCK STREET COLUMBUS 7, OHIO
In Canada: FOUNDRY SERVICES (CANADA) LTD., 201-7 Alice St., Guelph, Ontario

where they travel about 400 ft in a loop to the shakeout station.

Numerous interlocking switching devices and relays are included in the unit to insure proper functioning in each sequence of the operation.

That prevents the overloading or jamming of mold handling conveyor, molding machines, etc. Brillion Iron Works expects to produce a considerable amount of its smaller castings, as well as those which can be handled in the 18 x 18 in. flasks, on the automatic molding unit.

## Conveyor Manufacturers Hold 25th Annual Meeting

New president of the Conveyor Equipment Manufacturers Association is J. B. Nordholt Jr., president, Webster Mfg. Inc., Tiffin, Ohio. Mr. Nordholt was elected at the 25th annual meeting of the group, held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 21. Other officers include the following: Vice president, E. H. Woodberry, Lamson Corp., Syracuse, N. Y.; treasurer, L. J. Johnson, Mathews Conveyer Co., Ellwood City, Pa.; and secretary, E. E. Saperston, Mechanical Handling Systems Inc., Detroit.

Directors for the new year are O. A. Johnson, Gifford-Wood Co., Hudson, N. Y., H. A. Barber, Barber-Greene Co., Aurora, Ill., and E. P. Berg, Link-Belt Co., Chicago. R. C. Sollenberger continues as executive vice president.

## Philadelphia AFS Chapter Announces Foundry Course

The Educational Committee of Philadelphia Chapter of the AFS has scheduled a 15-week course in practical foundry study, which began Nov. 17, at Murrell Dobbins Vocational-Technical School, 22nd St. at Lehigh Ave., Philadelphia 32. Classes meet Monday nights from 7 to 10 p.m. Fees are $1 for registration and $3 for laboratory expenses.

Scope of the course includes bench and floor green sand molding with various types of patterns; coremaking; and melting, pouring, and handling of metal. The course is recommended for foundrymen who are not directly connected with molding or coremaking, yet require practical knowledge of how sand castings are made. It will be supplemented by plant visitations, lectures, films, and demonstrations.

One of a series on:

# why practical foundrymen select Simpson MIX-MULLER by four to one

**American Abrasives Metal Co.,**
**Irvington, N. J.,**
saved $2500 in bond alone during first year operating their 2F Mix-Muller.

**Studebaker-Packard Corp.**
**Manifold line**
—Sand output tripled: sand quality improved . . . moisture control improved . . . since installation of 2½F Mix-Muller. Is one of 13 Mix-Mullers used at South Bend, Ind. Foundry.

"Use of bond in system has been cut by 50% with no loss in quality."
**Superior Foundry Company**
**Cleveland, Ohio**

". . . our mulling cycle has been cut by 30% due to increased capacity and reduced mulling time. Facing has been eliminated."
**Xenia Foundry & Machine Co.**
**Xenia, Ohio**

## How Simpson mulling principle can save you up to 50% in bond cost

When a batch of sand and bond is mulled the sand will achieve *most* of its green strength early in the process . . . But, *most* isn't always good enough to do all jobs. Scrap, inferior castings, wasted time, money and material are poor reward for a half mulled batch of foundry sand—when the total savings in mulling time may be less than a minute.

There is another way to save mulling time . . . *use a great deal more bond*. You'll get your strength but it will still be earned at the expense of questionable sand quality . . . and bond is costly.

Some foundrymen make a choice—time or bond, but many more *get both* by doing one of two things:

(1) Changing to Simpson Mix-Muller
(2) Using their present Mix-Muller wisely

These *practical* foundrymen know from experience, that they may mull a batch a little longer in a Simpson but they also know that, model for model, the Mix-Muller can turn out more, better sand in a given time than any other sand mixer!

### Yes, you can save on bond with the Mix-Muller

. . . up to 50% as reported by users—but you'll save in six other ways too. Combined, these savings mean much more to practical foundrymen than a few seconds saved in mulling. They are the reason why, for almost 50 years, Simpson Mix-Muller has been the choice of *practical* foundrymen by four to one over any other means of sand preparation.

### SIX WAYS YOU SAVE WITH MIX-MULLER

**GET MORE FOR YOUR EQUIPMENT DOLLAR WITH MIX-MULLER**

Model for model, you'll mix more sand—get more tonnage per hour with large capacity Mix-Muller.

**SAVE RAW MATERIALS WITH MIX-MULLER**

Only *true* mulling permits you to use lean mixtures. You'll make the most of *less* oil, binder and other additives—and get top quality sand at the same time.

**YOU SAVE SCRAP WITH MIX-MULLER**

*True* mulled sand cuts down on casting, mold and core scrap.

**YOU SAVE CLEANING COSTS WITH MIX-MULLER**

Uniformly coated sand means better finish—right from the mold with less cleaning.

**YOU SAVE POWER WITH MIX-MULLER**

Mix-Muller takes only about ½ the power of other machines—to do the same or a better job. Only power required is used to plow and to roll mullers over the sand.

**YOU SAVE MAINTENANCE WITH MIX-MULLER**

Simple, rugged construction makes Mix-Muller easy to operate, maintain—and get parts for. Low speed mulling insures longer wear and part life to save you materials and man hours.

F-758

**National Engineering Company, 646 Machinery Hall Bldg., Chicago 6, Ill.**

*Circle 674 on Page 51*

# Foundry Developments

By EDWIN BREMER
Metallurgical Editor

INVESTMENT molding process evolved by Shaw Process Development Corp. is being employed for rapid duplication of steel dies for use in the pressure diecasting industry. An existing mold is used as the pattern, and the resulting duplicate is said to be produced with extremely close tolerances. Application of the molding process is reported being extended to production of original dies, thereby eliminating the usual machining or hobbing practices.

Greatest interest in both procedures appears to be in the brass diecasting field where die life is short because of the high temperature of the metal. The process also will permit manufacture of dies from the high-temperature alloys which are difficult to machine or hob.

## Beryllium Castings

BROAD program attempting to develop commercially feasible procedure for producing ductile castings of beryllium metal is to be conducted by Beryllium Corp., Reading, Pa., under a research and development contract received from the U. S. Air Force. Plan is to eliminate the lengthy and costly practice of making powder from ingot and consolidating it under high temperature and pressure to form blocks which are machined into the desired shapes.

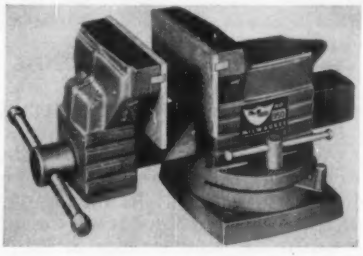
While intended primarily to produce ingots or billets which can be fabricated directly into sheet, rod, bar, etc., it is logical to expect that the development will lead to methods for production of structural castings with suitable properties.

## Surface Is Improved

STUDY of shell molding of low-carbon steel castings, which frequently show a defective surface finish when made in normal silica sand-resin mixtures, was made by the British Steel Castings Research Association, Sheffield, England. Additions of manganese dioxide, calcium carbonate, and lead dioxide were relatively ineffective except in thinner casting sections where a slight improvement was noted. Resin-bonded zircon sand with an addition of manganese dioxide produced definite improvement in surface quality, but best results were obtained with resin-bonded olivine sand with or without an addition of manganese dioxide.

## Resist Breakage

CONVERSION of all major components of its machinist vises to malleable iron castings has enabled Milwaukee Tool & Equipment Co. to guarantee them against breakage. Working closely in the design stages with Milwaukee Malleable & Grey Iron Works, the firm utilized



to advantage several of malleable iron's unusual mechanical and design properties. The firm also has redesigned all others in its line of vises to use malleable iron wherever possible. The conversion has replaced a number of forged parts.

## Carbide in Acid Cupola

USE of calcium carbide in the acid-lined cupola is discussed in an article, "Die Verwendung von Kalziumkarbid im Kupolofen," by Von Helmut Timmerbeil in the Aug. 28 issue of *Giesserei* (Duesseldorf, Germany). A special carbide containing about 72 per cent $CaC_2$ with a melting point around 1650° C (2822° F)—compared with the usual 80 per cent carbide type with a melting point between 1800 to 1900° C (3272 to 3452° F)—was used. Grain size of the material is 15 to 25 mm (19/32 to 63/64 in.).

In amounts from 1.75 to 2 per cent of the iron weight, the author indicates a saving of 20 to 50 per cent of the coke split. Through decrease in coke a reduction in sulfur in the iron occurs in the same order, and there is an increase in cupola melting rate. As a consequence of higher melting temperature a better carbon pickup occurs, which in turn provides more favorable shrinkage characteristics.

## Rigidity Needed

DISCUSSIONS on the aluminum automotive engine—just around the corner, according to recent publicity—usually bring out some interesting viewpoints. Actually, many problems must be resolved before such engines can replace the present type.

Recently it was mentioned that although diecasting can produce thin-section, 6-cylinder blocks weighing about 45 lb, it was intimated that they lack sufficient rigidity for service requirements. To obtain the necessary rigidity, a heavier-wall block weighing about 70 lb will be needed, and the logical production method would be by permanent molding using a sand core. Also it was indicated that the cost of equipment for permanent molding for the same rate of production would be considerably less than the $150,000 estimate for a diecasting machine.

## Protective Coating

CLEAR anodic coating for magnesium alloys that can be applied in less than a minute has been developed by Dow Chemical Co., Midland, Mich. The coating, which can be applied to sand, permanent mold, and diecastings as well as to other forms of magnesium, is used under a lacquer or varnish coating where a "metallic look" is desired. It is said to provide maximum corrosion protection. Lacquer or varnish tinted with commercial dyestuffs can be applied over the clear anodize to obtain a transparent effect in a wide variety of colors which have good permanence and are not washed out by detergents.

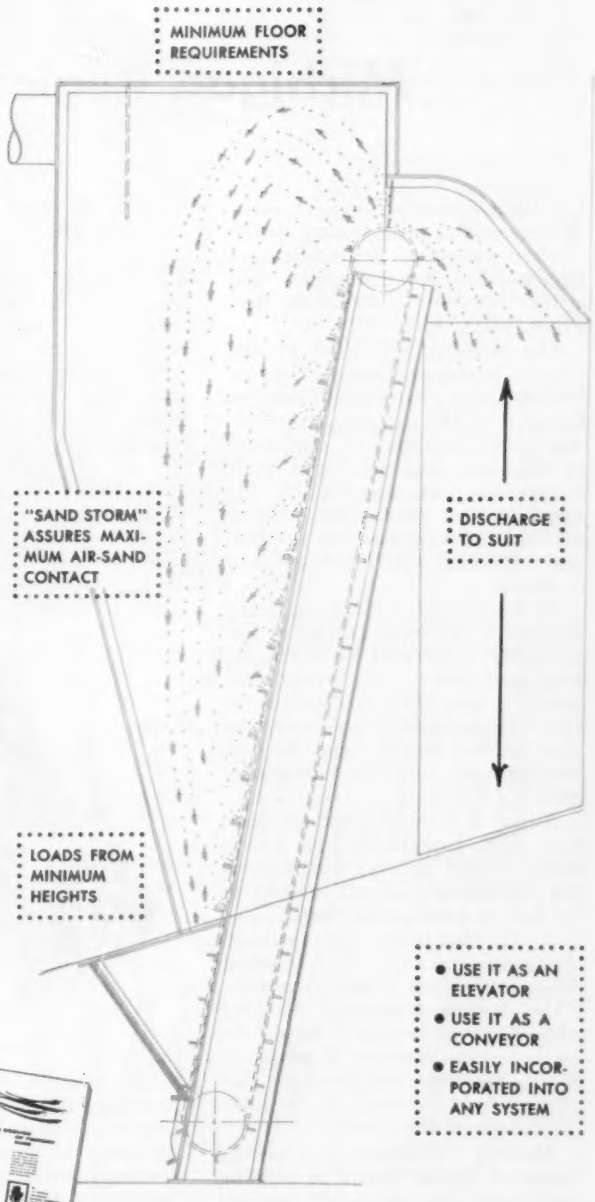
# NATIONAL COOLEVAYOR

## AT LAST...
## a practical, low cost solution to Hot Sand problems

Foundrymen have long realized the need for a competent *separate*, yet economical device to cool sand before storage. National Engineers have devoted several years to the development of such equipment because they wanted to develop a unit that would meet these qualifications and cool sand *fast*.

The National COOLEVAYOR *is* fast, efficient and extremely compact. It requires little more room than an elevator. It can, in fact, be used in *place* of an elevator or conveyor. The design permits a maximum time for air-sand contact and a maximum area for heat transfer. You'll notice in the drawing at right that a virtual *sand storm* is created within the generous sized housing.

*The result?* Coolevayor is designed to cool shakeout sand to within the range of room temperature—as it enters the muller or storage bin. Temperature drops of 100° and more, from 200°+, have been experienced—even on days of high humidity.


MINIMUM FLOOR REQUIREMENTS
"SAND STORM" ASSURES MAXIMUM AIR-SAND CONTACT
DISCHARGE TO SUIT
LOADS FROM MINIMUM HEIGHTS
• USE IT AS AN ELEVATOR
• USE IT AS A CONVEYOR
• EASILY INCORPORATED INTO ANY SYSTEM

SEND FOR BULLETIN

What we found out about cooling foundry sand during development of the Coolevayor makes informative reading for *anyone* with a hot sand problem. That's why we have recorded these findings in a new bulletin entitled THE COOLING OF FOUNDRY SAND. A copy will be sent to you free, upon request.

**NATIONAL ENGINEERING COMPANY**

646 Machinery Hall Bldg. Chicago 6, Illinois



Circle 699 on Page 51

## *Technical Developments Discussed at . . .*

# Michigan Regional Conference

By EDWIN BREMER
*Metallurgical Editor*

VARIOUS developments in melting, molding, and casting design were considered at the Michigan Regional Foundry Conference held at the University of Michigan, Ann Arbor, Mich., Oct. 15-16.

The meeting, sponsored by the Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters of AFS in conjunction with the student chapters of University of Michigan and Michigan State University, was attended by 325 members and guests. In addition to eight technical sessions, the program included two luncheons and a dinner.

At the first day's luncheon, Dean Stephen S. Attwood, College of Engineering, University of Michigan, welcomed those in attendance, pointing out that conferences of this type, promoting close co-operation between industry and the university, were mutually advantageous.

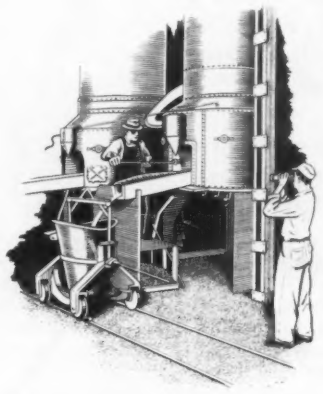
Ashley B. Sinnett, national secretary, AFS, spoke briefly on society activities and directed attention to the forthcoming annual meeting to be held in Chicago in April.

A. H. Homberger, International Automation Corp., Ann Arbor, Mich., presented a motion picture, "The Buhrer Automated Molding and Pouring Method," which described some features of an automatic molding installation. This process was described in the June, 1958, issue of FOUNDRY.

**Molding Practices** — Opening technical session related to molding techniques for obtaining castings with accurate dimensions, a subject discussed by five speakers. Prior to the meeting blueprints of a hook, a medium-sized ring sprocket, and a small connector plate were forwarded to the speakers, and some of the discussion centered around those parts. The speakers indicated that requested dimensional tolerances on some portions of the castings were too strict for even those molding processes which produce extremely close tolerances.

Shell molding was discussed by Joseph Orloff, Central Foundry Div., General Motors Corp., Saginaw, Mich. His firm's foundry employs a coated resin sand of 105 AFS grain fineness for both molds and cores. About 10,000 shell molds and approximately the same number of cores are made daily. Amount of metal poured daily is around 160 tons. Molds are poured in the horizontal positon and to aid in rapid cooling they are sprayed with water shortly after pouring.

Charles W. Schwartz, Misco Precision Casting Co., Whitehall, Mich., spoke on investment casting procedure. He stated that the recently developed Monoshell process has many advantages over the conventional investment method. In the shell method the disposable wax or plastic pattern is coated with finely divided refractory until a shell about ¼-in. thick is built up. Then it is coated with a coarser refractory aggregate. After air drying the shell molds are fired, melting out the pattern and converting the resulting shell mold into an extremely rigid structure.



The $CO_2$ process was discussed by Frank Ilenda, Diamond Alkali Research Center, Painesville, O. The speaker pointed out that sodium silicate binder seldom is employed alone due to certain characteristics, particularly difficulty in breakdown or disintegration after contact with some molten metals. That trouble is minimized by addition of organic materials to the silicate, and by the further additions of seacoal or pelleted pitch.

Some features of the Parlanti permanent mold process were described by Roger Vennerclassen, Niforge Engineered Castings Inc., Boston. In this process the molds are made of aluminum with the cavity faces anodized. Molds are designed on the basis of the quantity of heat to be extracted from the casting or castings.

Louis J. Pedecini, Congress Die Casting Div., Tamm Corp., Detroit, pointed out the advantages of making certain types of castings by the pressure diecasting method.

The session was concluded by Dr. Richard A. Flinn, University of Michigan, who stated that one of the difficulties in producing castings lies in the reactions occurring at the metal-mold interface. These reactions primarily are caused by presence of an oxidizing atmosphere in the mold cavity. In sand molds such an atmosphere promotes the reaction between molten iron and silica in the sand, forming silicate slags which can cause poor surfaces on the castings and often result in surface inclusions or slag holes.

**Melting Furnaces**—Afternoon sessions dealt with melting. Howard Wilder, Vanadium Corp. of America, Chicago, discussed cupola melting and traced some of the early history leading to the present-day high-melting rate, hot-blast, water-cooled cupola. First development in water cooling was use of external water glands to reduce refractory consumption. Later the glands were placed inside the shell and coated with refractory. Today shells are cooled with water sprays or with films of water which flow down over the shell. In many cases no refractory is employed on the inside. Protruding, water-cooled tuyeres also are employed.

# NATIONAL MOLDER'S HELPER

### *It's an "Elevayor"*

This unique National-patented equipment item will deliver a full mixer batch from discharge door to bin within 20-30 seconds. Can be designed to receive charge from front end loader too. Shoveling or extra handling is *completely* eliminated.

### *Use it with any Mix-Muller*

You've already cut your costs if you're now a Mix-Muller user! Molder's Helper can be used with any Model Mix-Muller (1F to 2½F)

Molder's Helper with 1½F Mix-Muller handles 1000 lb. batch. Is equipped with two 50 cu. ft. hoppers.

### *It's an aerator!*

Upper section of "Elevayor" automatically aerates sand. Another step eliminated, another item of equipment and labor that's *built-in* with this low cost mechanized National "package" unit.

### *It's overhead sand*

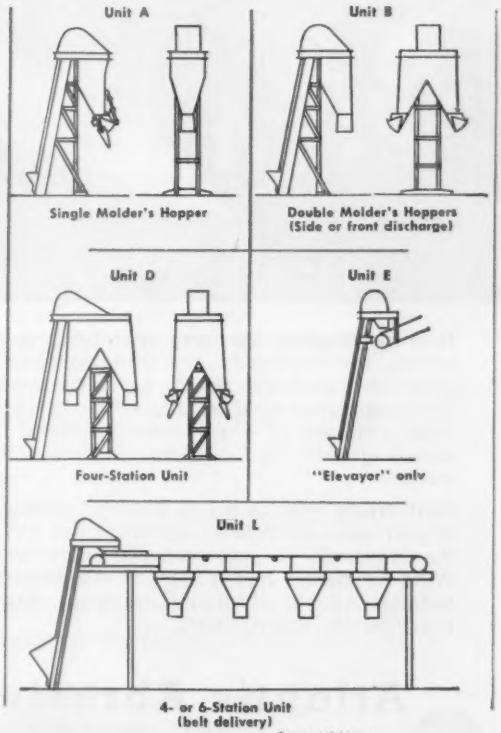
Sturdy, NATIONAL Molder's Hoppers receive fluffy, aerated free-flowing sand ready for molding — in seconds. Units available for 2, 4 or 6 molders stations. Riddling and shoveling are eliminated to cut molder's time up to 50%.

### *It's National Quality*

The Molder's Helper is a *foundry* proven item. Its design, fabrication and performance characteristics reflect the same quality of workmanship that is found in all National-engineered components.

### *Many arrangements possible*

Other arrangements available to suit specific requirements.




## Now any foundry can afford to have overhead sand!

The National Molder's Helper is designed to eliminate the costly time and labor consuming job of hauling sand from mixer to molder. With it, you can bring overhead sand to the smallest operation; *increase* molders production up to 50%; *eliminate* floor shoveling and *concentrate* your entire mixing and molding operation into no more floor space than one molder now occupies.

Cold hard *dollars* saved in increased efficiency, lower labor costs and better, more flowable sand—can quickly pay the small cost of the Molder's Helper. *But what's more* any foundry with a Simpson Mix-Muller already has a head start in equipment. Write for further details today, or let your man from NATIONAL give you an estimate.

**NATIONAL ENGINEERING COMPANY**

646 Machinery Hall Bldg.
Chicago 6, Illinois

*Circle 675 on Page 51*

ANOTHER!
PROVEN PRODUCT OF THE PRACTICAL FOUNDRYMAN
BY NATIONAL

Hot blast equipment began with the use of the recuperative system, taking partially unburned gases from the cupola and heating the air blast to a few hundred degrees. Improvement of that system and development of externally heated units permit heating the air up to around 1200° F. Eventually use of the hot blast and water cooling were combined.

Induction melting of nonferrous alloys was covered in two sessions. H. M. Rowan, Inductotherm Corp., Delanco, N. J., spoke on use of high-frequency type for brass and bronze melting, and G. F. Kolle, Ajax Engineering Co., Trenton, N. J., discussed application of line or 60-cycle type for melting aluminum and zinc. High-frequency units operate on frequencies from 180 to 3000, and cost roughly about $200 per kw. The 3000-cycle units are used for melting up to 200 lb, and the 1000-cycle units for 300 lb and more. The 180-cycle type is employed for melting large quantities.

Line or 60-cycle furnaces will melt about 5 lb of aluminum per kw hr of energy or 20 lb of zinc. Metal loss is low, about ½ per cent on the average. In the diecasting field there is an increasing use of such furnaces. For aluminum, 100 and 200 kw furnaces melting 500 and 1000 lb per hour, respectively, are being used. Lining life for holding furnaces is about 2 years and for melting furnaces the life is 8 months to a year. With zinc the same furnaces melt about four times as much and the lining life is much longer.

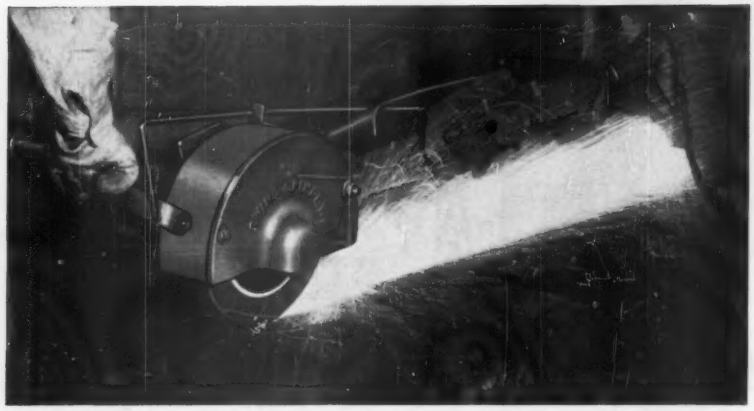
**Automotive Castings** — In three sessions held Thursday morning, automotive castings, synthetic sand, and casting design were considered. Conrad Orloff, Chevrolet Engineering Div., Warren, Mich., spoke on "Castings and the Automobile Industry" from the automotive engineer's viewpoint. He said that best results are obtained when the designer and foundryman are brought together early, and described several examples where such co-operation resulted in economy of both materials and processing. He indicated that the automotive designer has no preference in method of fabrication of a part as long as it fulfills its function best at the lowest weight and cost. In materials all that is desired is a sound piece with the necessary physical properties which is dimensionally accurate within required tolerance, and is not excessive in cost.

William Shartow, Chevrolet Gray Iron Div., General Motors Corp., Saginaw, Mich., pointed out that variations between foundries necessitate differences in sand selections, and each foundry must make its own decision. He then discussed some defects associated with molding sand. Scabs may be caused by high moisture, excess seacoal, and fines as well as hard ramming. Where flat surfaces are involved, slow pouring may be the cause. Drop outs result from sand too weak or too dry. Mold blows may be due to poor permeability or high moisture. Pinhole porosity usually results from gases generated by excess moisture or combustible materials in the sand.

Good casting design was discussed by James L. Raubinger, Central Foundry Div., General Motors Corp., Saginaw, Mich. He stated that the primary requirement is that the casting will perform its intended function satisfactorily. Additionally the cost of the finished product must be kept to a minimum. To accomplish that there must be an exchange of ideas between designer and foundryman.


# ATLANTIC WHEELS

**spark new savings on snagging operations!**



**Take the toughest snagging operation** you can find, add fast-cutting, cool-running Atlantic Grinding Wheels, and watch your grinding costs flatten out to a money-saving minimum. Made with a special resinoid bond to withstand high centrifugal forces, these work-proved wheels have a smooth, floating action that speeds up grinding . . . gives you cleaner surfaces with fewer passes.

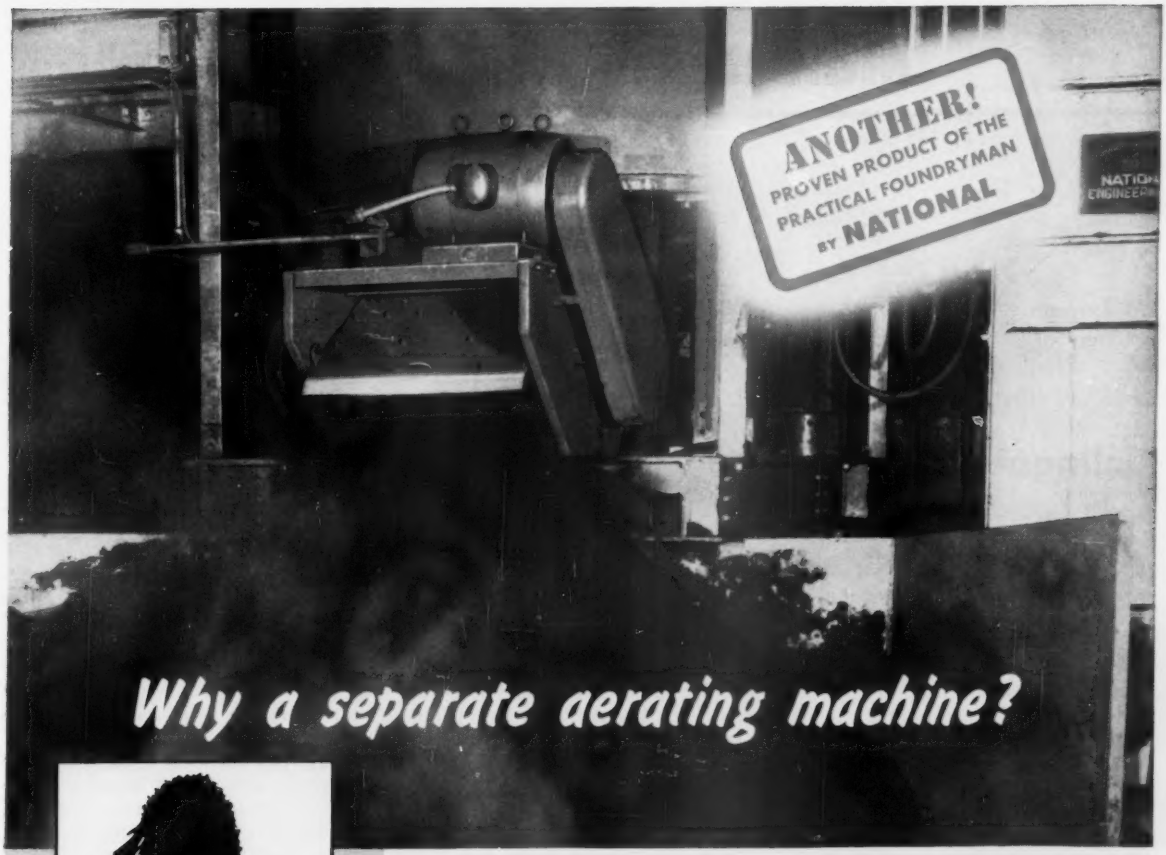
**Start saving now,** by giving Atlantic Grinding Wheels a trial run in your plant. An Atlantic representative will gladly recommend the right wheel for your particular operation without obligation. Write for details and a copy of the **Atlantic Grinding Wheel Catalog.** Atlantic Abrasive Corporation, 534 Pearl Street, South Braintree 85, Massachusetts.

**Atlantic Abrasive Corp.**

A DIVISION OF ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

STRAIGHT WHEELS • CYLINDER WHEELS • CUP WHEELS
CONES • PLUGS • MOUNTED WHEELS AND POINTS




# *Why a separate aerating machine?*

**Aerate your sand in half the time with the *improved* National Aerator.**

- **Rotors last twice as long**
- **Aerate sand as fast as mixer discharges**
- **30 to 50% reduction in power required**
- **No sand build-up with new rotor design**

**Write for specification sheet on National Aerators or ask for quotation on low cost conversion kit for your present National Aerator.**

**If aeration is important to the quality and handling of your sand you need an aerating machine.** Here is why National recommends separate aeration and why and how National Aerators make riddling unnecessary and provide free flowing, lump-free, easy-to-handle sand at the molder's station:

National Aerators are especially designed for direct attachment to the discharge opening of a Simpson Mix-Muller. The action is *fast, gentle* (no segregation of sand and binder) and *positive* . . . Special hardened combing fingers gently comb and fluff the sand without stripping or damage to coated sand grain.

Because National Aerators are specifically designed to *aerate sand* you'll get these benefits too: long wear life; *effective*, economical power usage with no hindrance to mixing action or quality of the prepared sand.

There's a National Aerator for every model of the Simpson Mix-Muller. And you can choose from several models of belt-type and conventional system aerators—for use *anywhere* in your system. *It's another product of the practical foundryman.*

F-158

**NATIONAL ENGINEERING COMPANY**

646 Machinery Hall Bldg. • Chicago 6, Illinois



Circle 624 on Page 51

# Man to Man

By RALPH L. LEE, *President*

Birmingham, Mich.
Lee Hobby Foundry

*"Investigation may reveal that we have been taking our cupola for granted and allowing it to drift away from the original practice"*

## Delinquent Cupolas

I HAVEN'T the slightest idea how many cupolas misbehave as often as the one in the Lee Hobby Foundry, but lately ours has been getting entirely out of hand—and after all we have done for it. We gave it a new room all by itself, a brand new upper stack, and just about everything.

Misbehaving at any time is bad enough, but a short time back it made an ass of itself right in front of company, and darned important company: Paying customers with a deadline shipping date to be met or else. It produced cold iron, again and again. The provoking thing is that for one long stretch I couldn't have asked for better and hotter iron, one heat after another. Then, all of a sudden, I got cold iron, bridging, and a general mess! At least that's the way it struck me in the midst of my woe.

**Misplaced Blame**—It happens I am an instinctive recordkeeper, although I sometimes used to wonder whether all of the paperwork involved really was worthwhile. I have no doubts now. I determined by all that is holy to take this delinquent cupola out to the woodshed and give it what it deserved. The switch never was used, however, for, as frequently is true, the parent was at fault. A review of my records proved that my recent melting mess did not pop out of the clear sky, as I had imagined, but had crept up on me with an increasing number of indications that I was due for trouble in a big way.

Reviewing my melting records for the last 12 years, I picked out all the heats marked "Excellent," "Hot Dog!" or some other, appropriate exclamation and examined them closely for points in common. The first discovery was that all of these good heats had the same coke bed height. Right along with this finding, I realized that I had forgotten what this height should be and had been roaming all over the lot.

The next revelation turned out to be that with the little old peewee cupola lined to 10 in., with coke 1 to 1½ in., with the blower staying put at the size it always has been, and the motor running as hot as it always has run, only so much iron could be melted in a given time, no matter how much more I needed. This point yanked me up short to the fact that I had been fudging, trying to sneak more metal into the poor perspiring peewee than it could handle.

*"Say 'Ah' "*

At this point I stopped feeling sorry for myself and began to have fun. The cupola always has had an air-flow indicator, graduated in cubic feet per minute, at which I had not even looked for many months (years maybe). Digging up my original drawings for the blower and the tests on which the airflow indicator was graduated, I discovered that the weight of the air passing through the charged cupola per minute checked exactly with the pounds of iron melted per minute on all of the good heats.

Up to this time I always had nodded my head with a knowing twinkle in my eye when someone commented, "A pound of air melts a pound of iron, Doc." I have a different feeling for this little gem of truth now.

**There's a Limit**—Further investigation proved that I had been playing rather fast and loose with my coke ratios. Being in a hurry for more and hotter iron than I deserved, I kept upping the coke until I got clear out of range. Now I know that I just can't do that.

In much the same extravagant mood, I had been loading the poor charges down with far more stone than was necessary—so much, in fact, that in some instances the air had a heck of a time getting through. I certainly have learned that if some is good, more is not necessarily better.

I also found that I had drifted so

**Ultimately,** *somebody* has to get rid of "plant" dust, dirt, smoke and fumes. If the job is left up to neighborhood housewives, the cost to management is exorbitant. Every speck of plant dust settling on a neighborhood is an emissary of ill will that leads, inevitably, to deterioration of plant-neighborhood relations.

The modern (and thrifty) way to attack the problem is with AAF Dust Control applied at all dust sources. This way, dust is trapped the instant it is produced. It never has a chance to irritate workers, arouse neighborhood housewives or run up your own plant cleaning costs.

For complete information on AAF's complete line of dust control equipment, write for "The Answers to the Five Basic Dust Problems" (Bulletin 270-A1). Address: Mr. Robert Moore, American Air Filter Company, Inc., 266 Central Avenue, Louisville 8, Kentucky. In Canada: American Air Filter of Canada, Ltd., 400 Stinson Blvd., Montreal 9.

AAF **American Air Filter**
COMPANY, INC., LOUISVILLE, KENTUCKY


Circle 625 on Page 51

30 YEARS WITH FORD: A pastry replica of a cupola decorated an informal gathering held recently at the Ford Cleveland Foundry to mark Plant Manager E. C. Jeter's 30th anniversary with the Ford Motor Co. Mr. Jeter began his Ford career in 1928 in the analytical laboratory, metallurgical control department, at the Highland, Mich., plant. He has held his present post since the plant was built in 1950. Mr. Jeter is a former chairman of the Northeastern Ohio Chapter of AFS

far afield from my original botting mix that a sledge hammer was necessary to open up the taphole. (I'm not kidding a bit.)

A repentant sinner can confess to a point where it gets to be downright bragging. Achieving that attitude is not my intention. I honestly feel contrite, but grateful that I am beginning to see the light.

Athough I never have operated a kingsized cupola, I haven't the slightest doubt that troubles increase as the diameter shrinks—and probably are squared or cubed. One can't have much heat to begin with; so he has to take care of what he has. I cooked up a scheme to insulate the bottom and put an insulated lid over the ladle (quite tricky).

**According to Schedule**—But the most important thing to me is that after riddling out the dos from the don'ts, I made up a cupola operating schedule from the very first move to the dropping of the bottom. It included dope on the proper quantity of newspaper and kindling, the quantity of first coke, and the quantity and time of coke additions right down to the properly burned-in bed. I have the scrap, pig, limestone, coke, and soda-ash charges down in black and white. Now, from blast on, with the first charge in place, I have the time for adding each charge, right on to the time of the first tap.

Day before yesterday, like an automaton following a punched tape or a player piano roll, I blindly and obediently followed the schedule right down to a gnat's whisker. The iron popped out in a white, dazzling stream, and I carried the stuff out to the farthest point on the floor (about 22 ft) and poured off to the very last dribble. It just goes to show you what bad habits a careless amateur foundryman can get into and the joy he can feel by repenting his sins and walking the straight and narrow.

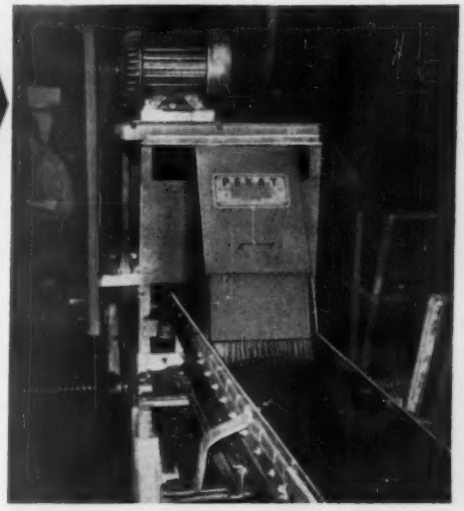
I appreciate, of course, that professional foundrymen never would get into the bad habits I acquired. There might be a point, however, to keeping a log and, without waiting for the roof to fall in, to checking over the traditional melting procedure occasionally and finding out What Ho and all that sort of thing, together with how we got this way, why, and when.

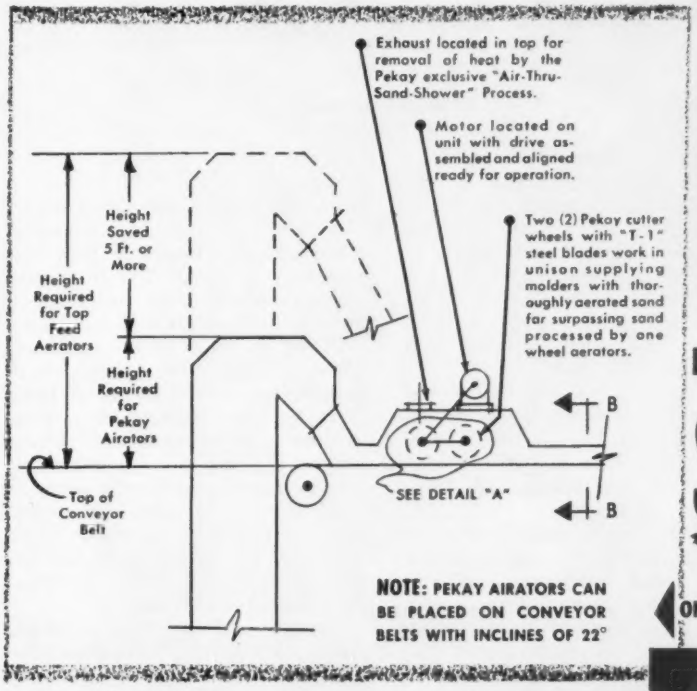
We might find that we have been taking the old reliable for granted, and, for longer than we think, allowing it to drift considerably from the way it started out. Then, too, we might discover that the old reliable, as faithful as it has proved to be, does not take into account recent discoveries. Just the satisfaction of proving that we are on the right track or operating according to Hoyle would be well worth the while. Anyway, I'm glad we had our cupola trouble. We're turning over a new leaf.

MARKET DEVELOPMENT: A Product & Market Development Divisional Conference was held by the Steel Founders' Society of America at Chicago, Oct. 24. Among the participants, left to right, were J. M. Ritter, Farrell-Cheek Steel Co., co-chairman; John B. Caine, consulting engineer, speaker; David Miller, Falk Corp., speaker; J. W. Perry Jr., Grede Foundries Inc., SFSA director; W. H. Shinn, Gunite Foundries Corp., co-chairman; Keith Millis, International Nickel Co. Inc., speaker, and George K. Dreher, SFSA market development director

# FOR THE BEST BLENDING and AERATING AT THE LOWEST COST, INVESTIGATE PEKAY BEFORE YOU BUY

The Pekay Airator requires no special supports. Unit fits right on your present conveyor channels requiring little space and can be placed anywhere in your sand system in less than 25 man hours.




Exhaust located in top for removal of heat by the Pekay exclusive "Air-Thru-Sand-Shower" Process.
Motor located on unit with drive assembled and aligned ready for operation.
Two (2) Pekay cutter wheels with "T-1" steel blades work in unison supplying molders with thoroughly aerated sand far surpassing sand processed by one wheel aerators.
Height Saved 5 Ft. or More
Height Required for Top Feed Aerators
Height Required for Pekay Airators
Top of Conveyor Belt
SEE DETAIL "A"
B
B
NOTE: PEKAY AIRATORS CAN BE PLACED ON CONVEYOR BELTS WITH INCLINES OF 22°

## ECONOMIZE TODAY WITH PEKAY

SAVE

- On reduced machining and scrap losses
- On lower operating and maintenance
- On easier and faster installation

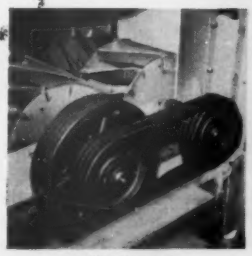
ON LOWER ELEVATOR AND BUILDING REQUIREMENTS

*Specifications:*

| Belt Width | Cutter Wheel Diameter | Maximum Sand Head | Capacity for belt Traveling 100 FPM |
|---|---|---|---|
| 18 | 12 | 3½ | 40 T. P. H. |
| 24 | 16 | 5½ | 125 T. P. H. |
| 42 | 20 | 8½ | 410 T. P. H. |

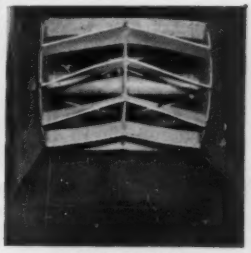
Pekay Airators can be made for any belt width and capacity

*Every unit guaranteed to meet customer requirements*



DETAIL "A"

Easy access to parts. Complete wheel replacement takes less than 2 hours. Wheel life averages two years on 40 hour week operation.



SECTION "B-B"

Cutter wheels traveling at 500 to 600 RPM thoroughly fluff, aerate, cool and break all lumps except core butts the size of pencil erasers.

**PEKAY MACHINE & ENGINEERING CO. INC.**

863 N. SANGAMON STREET CHICAGO 22, ILLINOIS

*Specialists in foundry sand conditioning and handling, slurry systems, engineering and equipment*

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____ CITY AND STATE_____

*I would like information on:*

☐ Pekay Mixer Mullers ☐ Pekay Coolerators

☐ Pekay Sand Systems ☐ Pekay Airators

☐ Pekay M-T-Matic Buckets

# FOUNDRY EQUIPMENT BUILDERS

## *Look to Expanding Markets*

By **WILLIAM G. GUDE**
Managing Editor

**GORDON E. SEAVOY**
*President*

**EINAR A. BORCH**
*First Vice President*

**RICHARD A. BRACKETT**
*Second Vice President*

**C. R. HELLER**
*Executive Secretary-Treasurer*

MOST foundry equipment builders look for a fourth quarter upturn in their sales volume to carry through next year. Opinion of individual manufacturers is almost evenly divided, however, as to whether the 1959 recovery will reach the 1957 level.

This outlook was expressed at the 40th annual meeting of the Foundry Equipment Manufacturers Association, held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 16-18.

In discussing business conditions, Einar A. Borch, vice president National Metal Abrasive Co., Cleveland, pointed to the influence exerted by the decline in durable goods demand and in inventories on general industrial activity during the recent recession. Price cutting on castings has been doubly harmful, he added. It has induced buyers to hold down inventories while looking for still lower prices, and has weakened the ability of foundries to finance plant modernization. Mr. Borch expects a gradual business improvement in 1959, followed by a more rapid upturn in 1960 and 1961.

FEMA president Gordon E. Seavoy, vice president, Whiting Corp., presided at the opening general session at which C. R. Heller, executive secretary-treasurer, reported on the association's various activities during the past year. A feature of the session was a panel discussion of the subject "Marketing of Foundry Equipment." R. A. Brackett, executive vice president, Spencer Turbine Co., was moderator of the four-man panel.

Mr. Seavoy described a detailed analysis made by the Whiting Corp. of the cost of salesmen's calls. While the cost per call varied somewhat with the type of equipment being sold, the relatively high average—in excess of $60 in recent years—emphasizes the necessity of utilizing the best available salesmen.

Philip F. Bauer, vice president, Allis-Chalmers International, said that American manufacturers have three principal choices in seeking to develop foreign markets. These are the acquisition of a firm abroad, subcontracting to a foreign shop, or establishment of foreign licensees. The last choice has grown in favor since the war, although it does increase competition for U. S. manufacturers in world markets.

George A. Pope, business manager, FOUNDRY, presented an analysis of the foundry industry from the standpoints of comparative size with other industries, types and sizes of foundries, market areas, and buying power.

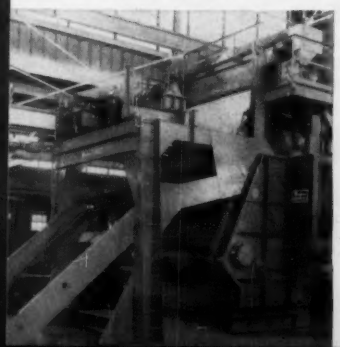
Techniques of business forecasting were discussed by David E. Davidson, vice president for sales, Link-Belt Co. He pointed out that capital goods do not lend themselves as readily as consumer goods to accuracy in sales predictions; nevertheless, there are a number of indexes which are useful for indicating trends and for comparison with experiences of the individual manufacturer.

Reports on activities of other foundry trade associations were presented at the concluding general session. Speakers included J. H. Whitehead, Whitehead Bros. Co., speaking for the Foundry Facings Manufacturers Association; Edward J. Walsh, executive director, Foundry Educational Foundation; Donald J. Workman, executive vice president, Gray Iron Founders' Society;

# BUILT BIG . . . TO CLEAN BIG

## Giant Pangborn unit Rotoblasts loads up to 12,000 lbs. in minutes!

A side view of the 72 cu. ft. Pangborn Rotoblast Barrel. Pangborn Barrels available in 1½, 3, 6, 12, 18, 20, 32, 72 and 102 cubic foot sizes



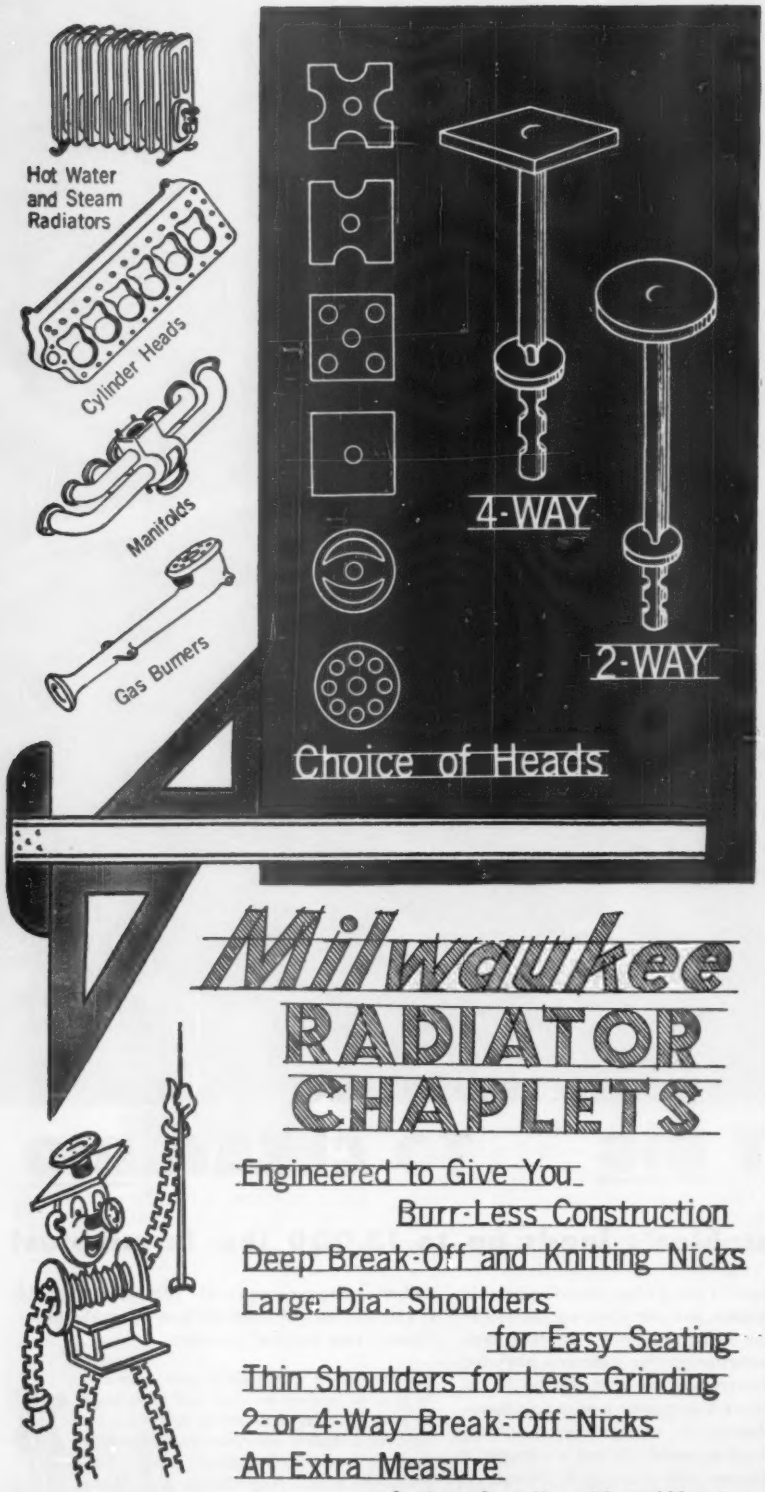
How do you build a giant blast cleaning barrel? If you're Pangborn, you use steel, inches thick. You put in the heaviest apron conveyor ever made. You incorporate the patented abrasive separator, abrasive-tight door, simplified Pangborn construction. You power it with two Rotoblast wheels that hurl *60 tons of abrasive an hour.*

Sure, it's tough to build . . . but it's worth it when you come up with a 72 cu. ft. Pangborn Rotoblast® Barrel! This unit cleans 6-ton loads *in five minutes* and gives the lowest operating and maintenance costs in the blast cleaning field! It's one of many Pangborn Rotoblast Machines. There's one for *your* problem.

*The Pangborn Engineer in your area will be glad to take off his coat and go to work on your cleaning problem at no obligation. And for complete information on Rotoblast Barrels, write to:* Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md. Manufacturers of Blast Cleaning & Dust Control Equipment.*

**Clean it fast with Pangborn ROTOBLAST®**

Circle 627 on Page 51




Lowell D. Ryan, executive vice president, Malleable Founders' Society; Arthur G. Hall, Nordberg Mfg. Co., and president of the National Foundry Association; and Gordon E. Seavoy, president, National Castings Council. Reports also were received from the Non - Ferrous Founders' Society and the Steel Founders' Society of America.

Foundries have made substantial progress in recent years in developing new materials and processes and in improving quality of their products, but appropriations for research in better ways of designing and selling those products have been pitifully small, it was stated by Ross L. Gilmore, president, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Speaking on "Meeting Today's Requirements for Quality Foundry Products," he pointed to the lag in consumption of castings compared with the rise in several indexes of industrial production between 1946 and 1955—a discrepancy which he attributed to lack of constructive selling on the part of foundries.

Mr. Gilmore discussed the use of brittle lacquers and strain gages for measuring stresses in castings, and presented a film describing how these tools are employed in perfecting the design and salability of a cast part.

Concluding speaker was William B. Wallis, president, Lectromelt Furnace Div., McGraw-Edison Co., Pittsburgh, who made some observations on Japanese industrial developments based on a recent visit to Japan. He reported that the Japanese are employing modern metallurgical practices, they are showing increased originality in their product design, and good workmanship is typical of the country's industry.

**Election of Officers**

In the annual election of FEMA officers, Gordon E. Seavoy was re-elected president and Einar A. Borch was re-elected 1st vice president. Richard A. Brackett was elected 2nd vice president, and C. R. Heller was re-elected executive secretary-treasurer.

Elected to the board of directors were P. A. Burns, manager, product sales, Robins Conveyor Div., Hewitt-Robins Inc., Passaic, N. J.; James F. Connaughton, president, Wheelabrator Corp., Mishawaka, Ind., and Bruce L. Simpson, president, National Engineering Co., Chicago.

It was announced that the 1959 annual meeting will be held at the Greenbrier, Oct. 15-17.

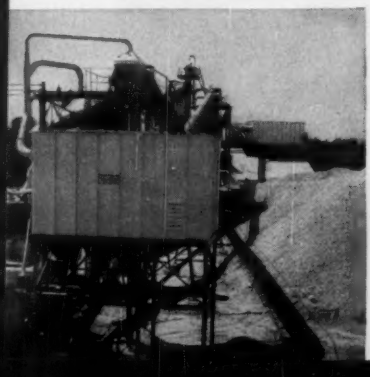

Circle 628 on Page 51

# Walkway to efficient dust control

See those bags? They're the *collect* in the Pangborn Cloth Bag Dust Collector. And they're efficient! The cloth filter has proved the most practical method for collecting finely divided dry dusts. But Pangborn goes a step further. Pangborn engineering has not only adapted this design to increase its collecting effectiveness but has simplified its construction. This means you save money. The Pangborn Cloth Bag Collector offers maximum efficiency, yet is economical to buy, install and operate.

Pangborn engineering is important to every dust-producing plant, regardless of the kind of collector needed. It is not enough to put a dust collector within a plant. An efficient dust collecting system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

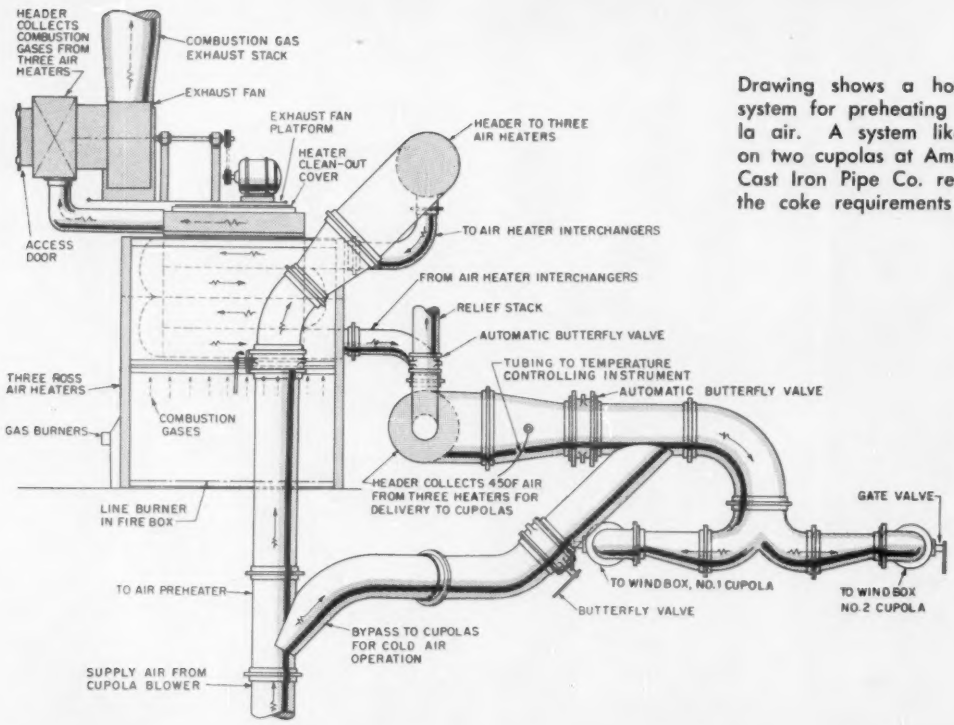
**Pangborn Cloth Bag Dust Collector on the job. This is just one of Pangborn's complete line of wet and dry dust collectors.**



*The Pangborn Engineer in your area will be glad to go to work for you. He is a dust* expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

**Pangborn CONTROLS DUST**

Circle 629 on Page 51


HEADER COLLECTS COMBUSTION GASES FROM THREE AIR HEATERS
COMBUSTION GAS EXHAUST STACK
EXHAUST FAN
EXHAUST FAN PLATFORM
HEATER CLEAN-OUT COVER
HEADER TO THREE AIR HEATERS
ACCESS DOOR
TO AIR HEATER INTERCHANGERS
FROM AIR HEATER INTERCHANGERS
RELIEF STACK
AUTOMATIC BUTTERFLY VALVE
TUBING TO TEMPERATURE CONTROLLING INSTRUMENT
AUTOMATIC BUTTERFLY VALVE
THREE ROSS AIR HEATERS
GAS BURNERS
COMBUSTION GASES
HEADER COLLECTS 450F AIR FROM THREE HEATERS FOR DELIVERY TO CUPOLAS
GATE VALVE
LINE BURNER IN FIRE BOX
TO AIR PREHEATER
TO WINDBOX, NO.1 CUPOLA
TO WINDBOX NO.2 CUPOLA
BUTTERFLY VALVE
BYPASS TO CUPOLAS FOR COLD AIR OPERATION
SUPPLY AIR FROM CUPOLA BLOWER

Drawing shows a hot-blast system for preheating cupola air. A system like this on two cupolas at American Cast Iron Pipe Co. reduced the coke requirements 25%

# HOT BLAST SYSTEM

## Cuts Coke Consumption 25 Per Cent

INSTALLATION of a hot blast system on two cupolas at American Cast Iron Pipe Co., Birmingham, Ala., has reduced coke requirements 25 per cent. The cupolas produce iron for flange bolts. Although this saving in coke enabled the system to pay for itself within a short time, the company feels that other advantages are even more important than the reduction in costs.

Most notable of these added benefits is the elimination of freezing of slag at the tuyeres and of resultant bridging. Relief from this problem was particularly appreciated in this instance since the cupolas are of small diameter. Bridging is more prevalent in smaller cupolas.

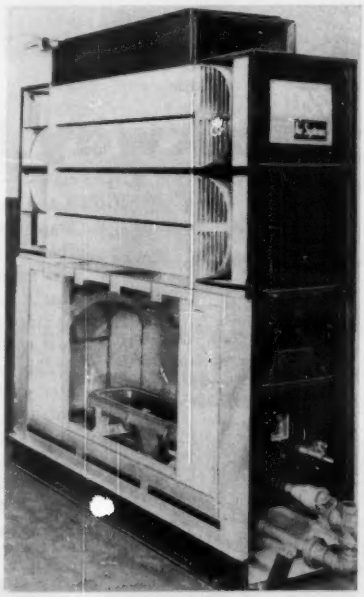
Additional advantages of the hot blast system include more nearly uniform control of melting temperature, more tonnage per hour, hotter iron, and less oxidation of silicon.

**External-Heater Type**—The hot blast system is of the external-heater type, which offers low initial and maintenance costs, and good flexibility of temperature control. The system was designed by the J. O. Ross Engineering Div., Midland-Ross Corp., New York, and is shown in the accompanying illustrations. It is fired by 1000-Btu natural gas.

Supply air, at the rate of 2000 cfm, is delivered by the cupola blower to a bank of three indirect heaters, where it is raised from 70 to 450° F. The system normally calls for 835,000 Btu per hour, although the heaters are designed to deliver up to 1,500,000 Btu per hour if necessary.

Air enters the heaters from a tapered header with a takeoff branch at each heater. Inside the heaters, the air travels horizontally within heat exchanger tubes which make four passes through combustion gases that rise vertically from the fireboxes below. Heated air discharges into a tapered header which connects to the duct system, windboxes, and cupolas.

**Curtailing Melting** — To curtail the melting rate for brief periods, a relief stack is provided at the large end of the hot gas header so that



Exposed view of the air heater used in the hot blast system at American Cast Iron Pipe Co.

# Lowest blast cleaning cost ever with

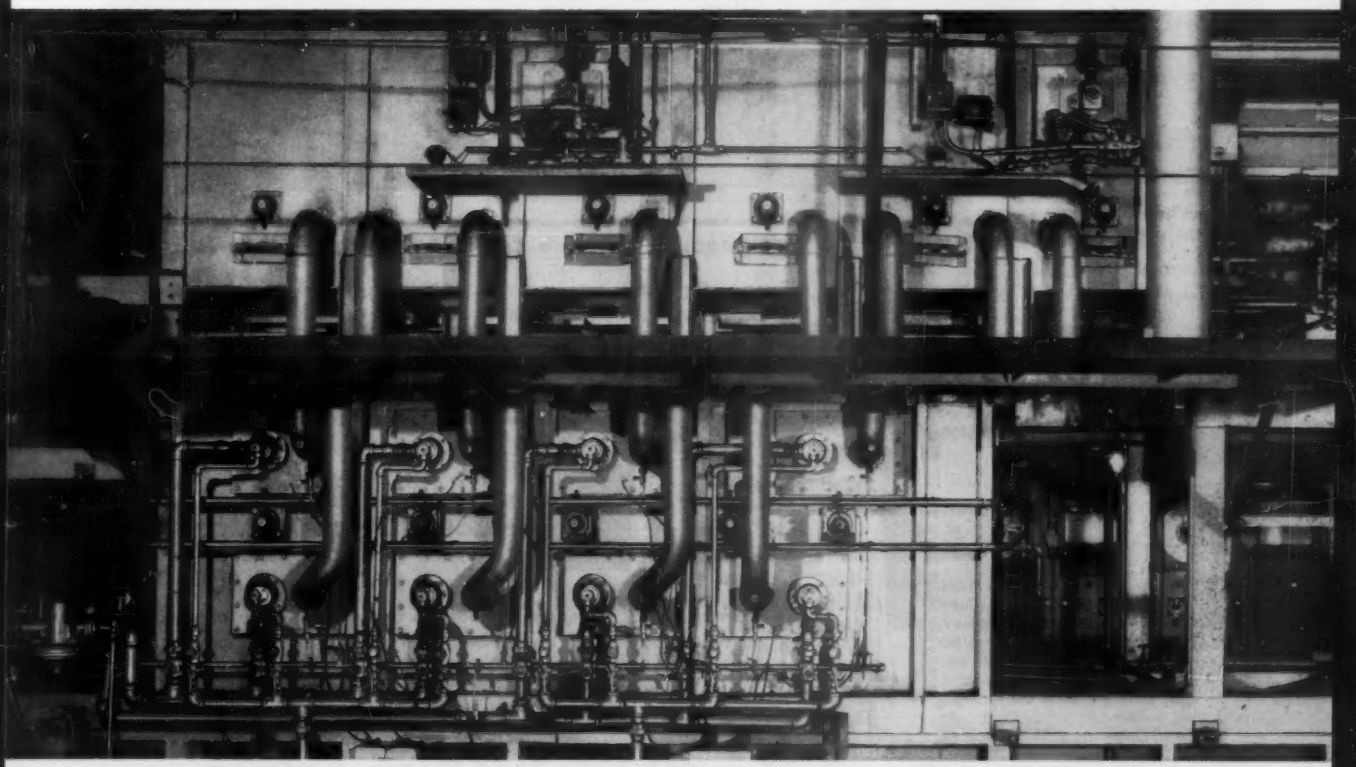
# ROTOBLAST® STEEL SHOT

### ✓Vacuum Casting

Electric furnace alloy steel, for the first time shotted in revolutionary vacuum chamber for greater density, eliminating voids and defects. You get a fatigue resisting shot for better, faster cleaning.

### ✓Continuous Heat Treating in Controlled Atmosphere

Uniform heating for every particle, in controlled atmosphere (zero oxygen), gives you ball bearing, heat treating quality for uniform hardness and longer wear life.



This is one of the new Rotoblast Unit Line Furnaces, the first of their type, with which Pangborn is bringing a new concept of quality to the steel abrasive industry.

**Pangborn**

**See for yourself! Call the Pangborn Engineer in your area or write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.**

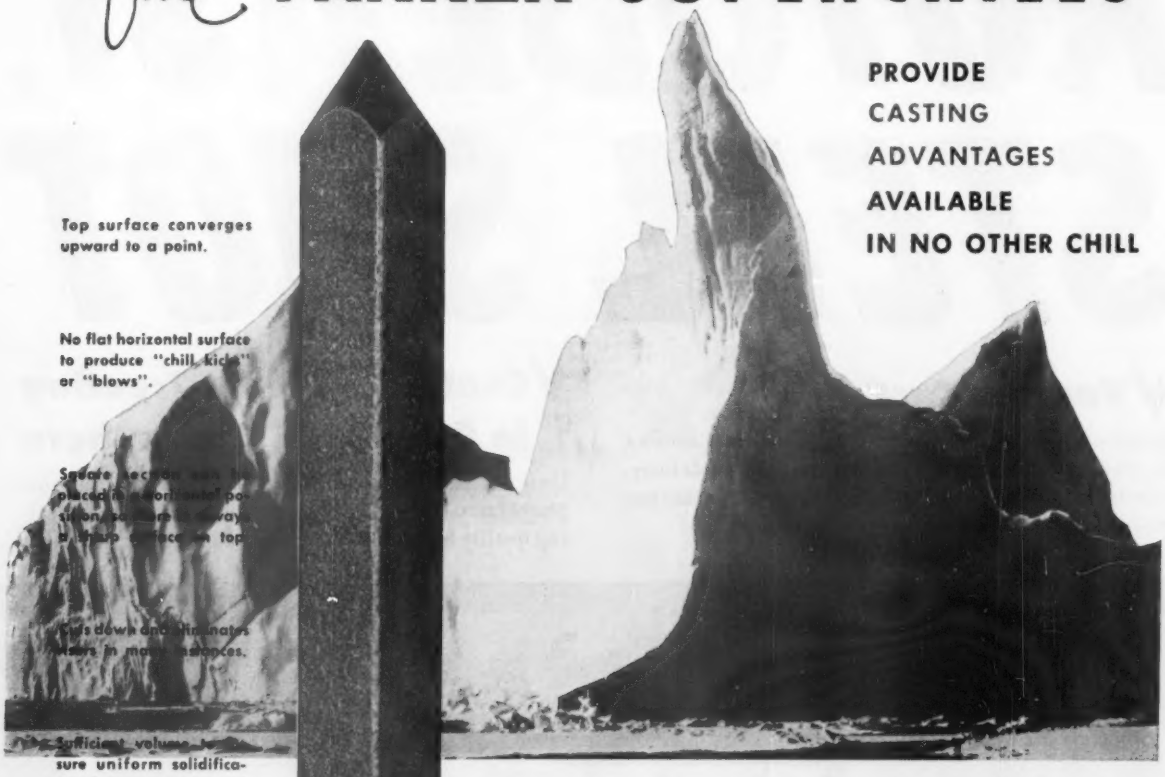
## Rotoblast® Steel Shot

Circle 630 on Page 51

## when it comes to CHILLING... there's no CHILL like

# fine FANNER SUPERCHILLS

**PROVIDE CASTING ADVANTAGES AVAILABLE IN NO OTHER CHILL**



Top surface converges upward to a point.

No flat horizontal surface to produce "chill kicks" or "blows".

Square section can be placed in a horizontal position so there is always a sharp corner on top.

Cuts down and eliminates misruns in many castings.

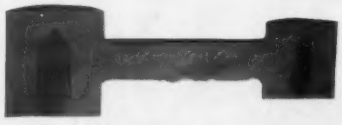
Sufficient volume to insure uniform solidification between center and outer surface.

Completely eliminates all "piping" by use of proper size chill.

- Fine Fanner Superchills are made in a wide variety of sizes and shapes — uncoated or coppered. They provide better surfaces for molten metal to join with and more chilling volume per pound. They have universal use throughout industry.

### designed to produce *correct* chilling at lowest cost!

Fanner Superchills are superior in the pouring operation because they are scientifically designed to produce proper chilling without "blows" . . . without "kicking away" . . . without defects. The top surface has a tapered point which is enveloped gradually as molten metal rises in the pouring operation . . . allowing ample time for gases to escape before Superchill is submerged and fused. (See cross section).



The *center section* is square so that the Superchill can be placed in a horizontal position in such a way that there is no flat surface at the top but a corner at all times. Square headed tacks in the core box or on the pattern are used to indicate position. Frequently, when a round chill is used, fusion is not complete, and when drilled, the chill turns with consequent breakage. The square Superchill cannot turn . . . and its corners aid in fusion. If you do not have complete information on these exceptional Superchills, write for details today.

## THE FANNER MANUFACTURING CO.

*Designers and Manufacturers of Fine Fanner Chaplets and Chills*

BROOKSIDE PARK CLEVELAND 9, OHIO

**THESE FINE FANNER REPRESENTATIVES ARE AT YOUR SERVICE**

**ALABAMA**
Hill & Griffith Co.
Box 1232
Birmingham, Ala.

**CALIFORNIA**
Barker Fdry. Supply Co.
4887 Fruitland Ave.
Los Angeles 58, Calif.
Pacific Graphite Co.
2522 Malt Ave.
Los Angeles, Calif.
Pacific Graphite Co.
40th & Linden Streets
Oakland, California
Snow & Galgiani
533 Second Street
San Francisco, Calif.
Barker Fdry. Supply Co.
120 S. Linden Avenue
S. San Francisco, Calif.

**COLORADO**
Mine & Smelter Sply. Co.
1422 17th Street
Denver, Colorado

**ILLINOIS**
Hill & Griffith Co.
4606 West 16 Street
Chicago 50, Ill.
Foremost Fdry. Sply. Co.
Chicago, Ill.
Mail Address:
2400 S. 43 Street
Milwaukee, Wisc.
The S. Obermayer Co.
2546 West 18 St.
Chicago 8, Ill.

**INDIANA**
The John M. Glass Co.
18 S. New Jersey
Indianapolis, Ind.
Hill & Griffith Co.
4000 E. 16 Street
Indianapolis 18, Ind.
Frederic B. Stevens, Inc.
36 Shelby
Indianapolis, Ind.

**KANSAS**
Canfield Foundry
Supply & Equipment Co.
1721 Minnesota Ave.
Kansas City, Kansas

**MASSACHUSETTS**
Springfield Facing Co.
Willimansett, Mass.

**MICHIGAN**
A. T. Wagner Co.
2720 Wight
Detroit, Mich.
Frederic B. Stevens, Inc.
1800 Eighteenth
Detroit 16, Mich.
Wolverine Fdry. Sply. Co.
3211 Belleview Ave.
Detroit, Mich.
E. J. Woodison Co.
7415 S. Aubin
Detroit, Mich.

**MISSOURI**
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Missouri
St. Louis Coke &
Foundry Supply Co.
1525 Sublette Ave.
St. Louis 10, Missouri

**NEW JERSEY**
Springfield Facing Co.
S. 2nd & Bergen St.
Harrison, N. J.

**NEW YORK**
E. J. Woodison Co.
146 Chandler
Buffalo, N. Y.
Frederic B. Stevens, Inc.
93 Stone Street
Buffalo 12, N. Y.
Lovejoy Patent Spec. Co.
Hoosick Falls, N. Y.
M. L. Doelmen
79 Morgan Parkway
Williamsville, N. Y.

**OHIO**
Buckeye Products Co.
7020 Vine Street
Cincinnati, Ohio
Goehringer Fdry. Sply. Co.
919 West Fifth
Cincinnati 3, Ohio
Hill & Griffith Co.
1262 State Avenue
Cincinnati, Ohio
Federal Fdry. Sply. Co.
4600 East 71 Street
Cleveland 5, Ohio
Galion Fdry. Spec. Co.
131 W. Walnut Street
Galion, Ohio
Fenton Fdry. Sply. Co.
134 Gilbert Ave.
Dayton, Ohio
The S. Obermayer Co.
647 Evans Street
Cincinnati 4, Ohio
Huffman Fdry. Sply. Co.
1193 Main Ave.
Cleveland, Ohio
Freeman Supply Co.
1152 East Broadway
Toledo, Ohio

**OREGON**
LeGrand Ind. Sply. Co.
155 W. Arthur
Portland, Oregon

**PENNSYLVANIA**
J. S. McCormick Co.
25th St. & A.V.R.R.
Pittsburgh 22, Penna.
The S. Obermayer Co.
33rd & A.V.R.R.
Pittsburgh 1, Penna.
William E. Hoffman & Son
3404 Circle Ave.
Reading, Penna.
S. G. Walton
80 26th St.
Pittsburgh 22, Penna.
J. J. McCoy
5232 Hutchinson
Philadelphia, Penna.

**TENNESSEE**
F & L Sales & Service
1015 West Kirkland Ave.
Nashville, Tenn.

**TEXAS**
M. A. Bell Co.
5802 Colfax Ave.
Houston, Texas

**WASHINGTON**
Pearson & Smith
W. 1133 College Ave.
Spokane, Washington
Carl F. Miller & Co.
1217 6th Ave., S.
Seattle, Washington

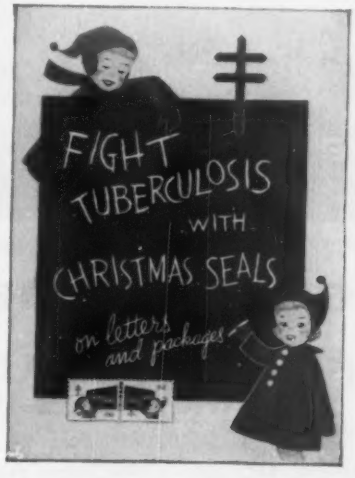
**WISCONSIN**
Fire Brick Engineers Co.
2400 S. 43rd St.
Milwaukee 1, Wisc.
Foremost Fdry. Sply. Co.
2400 S. 43rd St.
Milwaukee, Wisc.

**The FANNER MANUFACTURING Co.**
**Brookside Park**
**Cleveland, Ohio**


heated air can be spilled to the atmosphere, avoiding the necessity of shutting down and restarting the burners. The relief stack is of smaller diameter than the hot air header to simulate the resistance to the air flow offered by the cupola and thus maintain approximately the same pressure balance as when the cupola is in operation.

When the relief stack is used, a pushbutton control operates synchronized butterfly valves which open the relief stack and simultaneously close the cupola supply duct. A second button reverses the valves when melting restarts.

Each heater's firebox contains a




rectangular line burner which uniformly heats the bank of heat exchanger tubes above the firebox. The lower row of tubes is of special alloy construction to withstand the higher temperatures in this section of the heater. Combustion gases are collected in a header and discharged to the atmosphere by an exhaust fan.

The cupolas usually are operated alternately so that while one is operating the other can be relined. To prevent hot air from entering the down cupola while men are working on it, manually operated blast gates are provided at each cupola.

**Air Temperature Control** — Air temperature is controlled by a recorder-controller which regulates a control valve in the main gas supply line, thereby controlling fuel input and heater output. A gas-filled controller bulb in the cupola hot blast supply duct senses temperature changes in the blast air temperature and activates the recorder-controller accordingly, via connecting tubing. Expanding liquid-bulb and electronic thermocouple-type controllers also can be used as the temperature-sensing element. In any event, however, the temperature-sensing element should be located in a section of ducting close to the cupola so that it will indicate air temperature near the point of application.

The system is provided with a bypass duct which circumvents the heaters should it be desirable to operate the cupolas with cold air. Manually operated butterfly blast gates in the bypass duct and in the main duct direct the incoming air as desired.

**Safety Control**—Safety control is provided by pressure-type airflow switches in the cupola supply duct and in the relief stack. These switches will shut off the burners should the air flow fall below a preset point. Likewise, a suction-type air-flow switch in the combustion-gas exhaust header performs the same function should air flow within the header fall below a predetermined limit. Other safety devices include flame detectors at each heater which automatically cut off the fuel supply in the event of pilot flame failure.

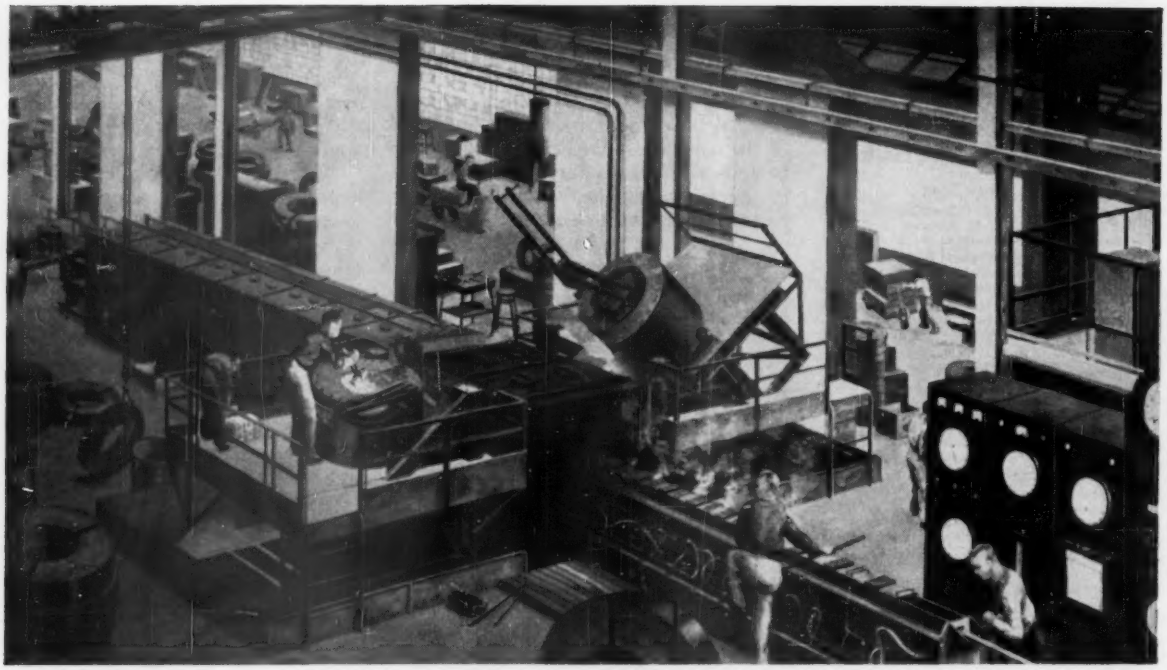
American Cast Iron Pipe has a similar hot blast system on four additional cupolas used to produce iron for pipe fittings. This system utilizes seven heaters rated at 500,000 Btu per hour each, for a total of 3,500,000 Btu per hour.

## Book Review

***Adressbuch der Giesserei-Industrie in der Bundesrepublik Deutschland*** **(Directory of the Foundry Industry in the German Federal Republic), cloth, 442 pages, 5¾ x 8 3/16 in., published by Giesserei-Verlag G.m.b.H., Breite Str. 27, Duesseldorf, Germany. Price 20 D.M.**

This is the second and expanded edition of a directory first published in 1951, and lists 2237 foundries located in West Germany. In addition to the firm names and addresses, information on the type of metal cast and class of operation as jobbing or captive or both is given. In many cases details on owners, directors, managers, foundry superintendents, and sales managers are included. Information on weight range and types of castings produced is given for some foundries.

Indexes in German, English, French, Italian and Spanish give pertinent information on the contents, designations employed, and how to use the directory. Foundry organizations also are listed.



# 60 CYCLE INDUCTION MELTING OF HIGH LEADED BRONZES

15 years ago, THE CLEVELAND GRAPHITE BRONZE COMPANY, division of CLEVITE CORPORATION, pioneered 60 CYCLE INDUCTION MELTING of bronzes with up to 35% lead. Special furnaces developed by AJAX for this difficult job are an important element in their unique continuous production line for steel-backed bronze bearing strip. 60 CYCLE INDUCTION MELTING furnaces resulted in substantial improvements and cost savings over gas-fired units used earlier for that purpose. Today, CLEVITE operates six continuous lines in this country and abroad with AJAX 60 CYCLE INDUCTION MELTING furnaces, producing enough strip to make 130 million bearings and bushings per year.

The heavy duty 60 cycle inductor developed by AJAX and pioneered by CLEVITE will attain a lining life of one year with bronzes of substantial lead content. Electromagnetic stirring assures uniform alloy and close temperature control. Compared to externally fired equipment, metal loss savings run into many thousands of dollars per year. Recently, several large producers of leaded bronze castings converted their foundries entirely to 60 CYCLE INDUCTION MELTING.

While this is one of the most difficult metals to handle, the advantages of 60 CYCLE INDUCTION MELTING stand out today wherever copper alloys are melted. As specialists in 60 CYCLE INDUCTION MELTING, we have developed furnace types to best fill each application.

AJAX USA

## ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

60 CYCLE INDUCTION MELTING

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company



Circle 632 on Page 51

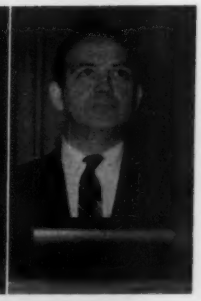
## CONFERENCE SPEAKERS

WILLIAM H. BAER

E. FRANK TIBBETTS

THOMAS KILEY

WILLIAM B. CORCORAN

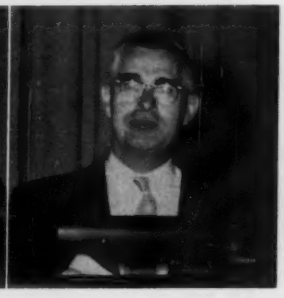


ALFRED B. STECK

EARL JAHN

ANTON DORFMUELLER

RICHARD L. OLSON



JOSEPH B. STAZINSKI

## *Modernization and Profits Is Theme at . . .*

# NEW ENGLAND CONFERENCE

By JACK C. MISKE
*Associate Editor*

"MODERNIZATION and Profits" was the theme of the 18th New England Regional Foundry Conference, held Oct. 17-18 at Kresge Auditorium, Massachusetts Institute of Technology, Cambridge, Mass. Indian summer weather and the lure of a program designed to help foundrymen combat the slowdown in casting orders attracted a large attendance at the meeting.

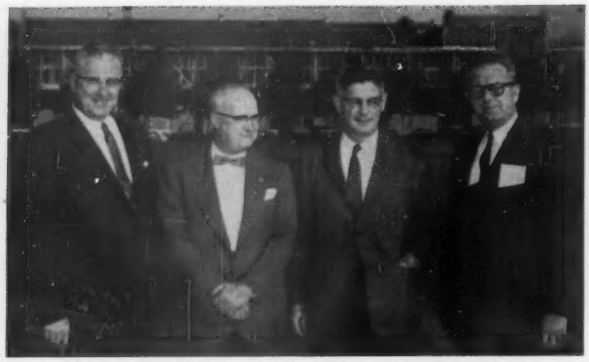
The conference was opened by Alexander Beck, Whitman Foundry, Whitman, Mass., vice chairman, in the absence of Clyde W. Armstrong, Shahmoon Industries Inc., Warren Foundry & Pipe Div., Everett, Mass., chairman.

Foundrymen present were welcomed to the MIT campus by C. Richard Soderberg, dean of engineering, MIT, who noted that the institute and foundry groups in the region had enjoyed a mutually beneficial relationship for many years.

William N. Ohlson, Draper Corp., Hopedale, Mass., and president, New England Chapter, AFS, spoke briefly to greet the audience on behalf of the American Foundrymen's Society. Greetings from AFS also were addressed to the conference by Charles E. Nelson, Technical Div., Dow Chemical Co., Midland, Mich., and vice president, AFS. Mr. Nelson reported that society membership is at an alltime high of approximately 13,000 individuals in 47 chapters. New technical divisions include the ductile iron and diecasting and permanent mold divisions. Diecasting, he said, has a great future, particularly as an automated operation. Mr. Nelson also discussed other aspects of AFS activity and called for support of the biannual Engineered Castings Show, which will be held in Chicago next year and in Boston in 1961.

**Utilizing Latest Developments in Molding, Coremaking, and Casting Processes for Increased Profits**—by Alfred B. Steck, Metallurgical Associates Inc., Boston. Numerous new developments have taken place in the foundry industry in recent years. Many can help foundrymen to produce better castings at less cost. These developments have included such areas of operations as melting, coremaking, molding, patternmaking, cleaning, annealing, and others. Some involved new types of equipment or materials, and others represent improved practice and techniques. Each foundry should use those applicable to its operation to increase profits by reducing manufacturing costs and increasing sales.

**Production of High Quality Aluminum Sand Castings**—by William B. Corcoran, Draper Corp., Hope-



AFS representatives at the meeting included, left to right, A. A. Hochrein, national director; Charles E. Nelson, national vice president; Thomas W. Curry, national director; and Henry Stenberg, national director and regional vice president, Region 1

dale, Mass. Draper's aluminum foundry regularly is producing the following physical properties in unchilled test bars in the T-6 condition: Tensile strength 41,000 psi; yield strength 31,000 psi; elongation 4.6 per cent; brinell hardness 86. Restricted analysis 355 and 356 alloys are melted in propane-gas-fired No. 100 crucible furnaces. Heats are weighed accurately, and remelt is controlled carefully to prevent mixing. Metal is degassed with chlorine pills, and it is poured into square basins so situated as to be close to the pouring spout. In the mold, metal flows into the cope runner through a strainer. Sand is a synthetic mix of 130 fineness. Properties of chilled bars and castings average as high as 45,000 psi tensile strength, 32,000 psi yield strength, and 7-8 per cent elongation.

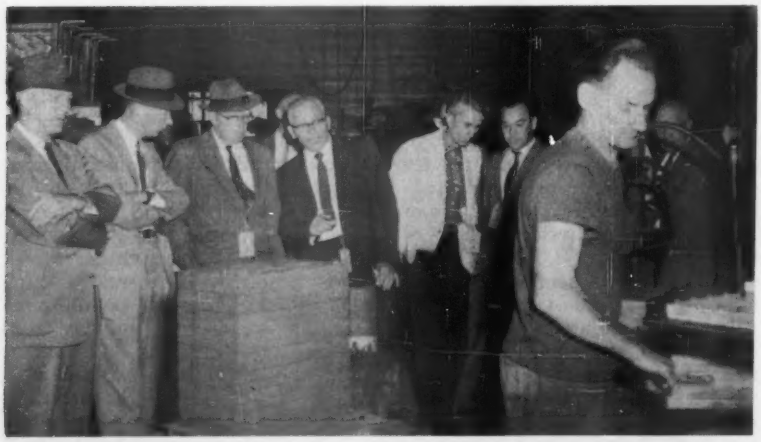
**Estate Planning—What It Means to You**—by M. Luther Buchanan, chartered life underwriter, Boston. This brief special presentation dealt with the importance of planning disposition of an estate for businessmen and with some of the major considerations involved.

**Gating and Risering**—by Thomas Kiley, Meehanite Metal Corp., New Rochelle, N. Y. Many factors contribute to effective gating practice. These include pouring basin design; size and location of sprue, runner bars, and ingates; and use of skim gates and strainer cores. These steps in gating are necessary: 1. Decide whether the casting is to be poured fast, medium, or slow. 2. Determine poured weight of the casting. 3. Determine time required to pour. 4. Select sprues to give the desired pouring speed. 5. Provide suitable dirt traps and chokes. 6. Distribute the ingates properly. Risers must be used in the required sizes and places to insure feeding.

**Application of Shell Cores—Interest to All**—by Earl Jahn, Shell Process Inc., Chicopee, Mass. Shell cores are accurate; they do not sag or fin. Gas evolution is low, and no core vents are required. Their strength is such that breakage is extremely slight, and lower weight means easier handling. Intricate cores can be blown denser at lower blow pressures. Coresetting is simpler, and rejects due to shifted or sagged cores are rare. The cores can be made close to the molding line and used immediately. Floor space required also is less. The sand mix can be formulated weeks ahead and can be moved easily. As little as 2 per cent resin can be used in some cores. Disadvantages include the need to learn how to coat sand, the cost of cast iron coreboxes, impracticality of the process for short-run production, and the requirement that hot cores be handled with gloves.

**Pattern Construction and Rigging — Improved Techniques in Coreblowing**—by Richard L. Olson, Dike-O-Seal Inc., Chicago. A new technique for avoiding fins on castings achieves tight abutment of cope and drag molds through the use of rubber strips 0.005 to 0.010 in. thick on bearing surfaces of flasks. Corebox design is an important factor in the production of good castings at lowest cost, and some companies are making clay models of coreboxes to determine best partings and avoid expensive errors. Boxes should be designed to make full use of blowers. Replaceable steel wear-pad inserts also reduce costs. Pattern engineers can simplify pattern construction and casting production. They should work with customers as much as possible. AFS is allocating $5000 to its Pattern Division to investigate better coatings for wood patterns.

**Repair and Salvage of Nonferrous Castings** — by E. Frank Tibbetts, Wollaston Brass & Aluminum Foundry, Wollaston, Mass. Foundries are not the only metalworking



FOUNDRYMAN'S HOLIDAY: Approximately 250 foundrymen from the New England and Connecticut Chapters of AFS toured the plant of Chapman Valve Mfg. Co., Indian Orchard, Mass., on Sept. 12. The Chapman operation includes steel, gray iron, and brass foundries as well as machining facilities. The program included a talk by Sidney Low, Chapman director of research, on sand reclamation in the steel foundry, and was concluded by a dinner. Photograph by John H. Orrok, Debevoise-Anderson Co.

(PATENT APPLIED FOR)

# NEW

# MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

SAFETY BACK far surpasses ordinary safety features such as anchor bushings, safety rings, special hub mountings, or revolving cup guards. With SAFETY BACK, steel covers the *entire* back of the flared cup . . . extends down the side to offer a degree of reinforcement and breakage resistance never before possible!

**NO OTHER WHEEL—AT ANY PRICE—OFFERS THESE EXCLUSIVE FEATURES**

- **Greatest Initial Strength**
- **Highest Safety Factor**
- **Easy Mounting—Easy Operation**
- **Improved Mounting Base**
- **One Piece Assembly**
- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

GRINDING WHEEL INSTITUTE MEMBER

**WRITE TO THE ABRASIVE WHEEL DEPARTMENT**

**MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY**

## RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls



Circle 633 on Page 51

# Core Hardness

Checked in Seconds!

with

**Gordon & Campbell CORE HARDNESS TESTER**

Why take chances with questionable cores? With this simple tester you obtain the true hardness value by measuring a definite depth of penetration of a spring-loaded abrading point. The hardness value is read direct on the graduated dial—no computation.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for these testing units.

*All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.*

**FREE TO ANY FOUNDRYMAN**

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

GORDON SERVICE

**CLAUD S. GORDON CO.**

*Manufacturers & Distributors*

Metallurgical Testing Machines • Industrial Furnaces & Ovens • Temperature Control Instruments • Thermocouples & Accessories

607 W. 30th St., Chicago 16, Ill.
2027 Hamilton Ave., Cleveland 14, Ohio

*Circle 634 on Page 51*


companies which make mistakes. Castings which are not quite acceptable as made often can be salvaged. Some apparently slight imperfections are serious, and some gross defects may not be important. Understanding of the real nature of a defect is vital. With it, a foundryman can decide what castings can be salvaged and in what fashion. He and the customer should have an understanding regarding salvage and repair, for they can save the customer money when done correctly.

Major types of salvage involve impregnation and welding. Impregnation should be used with slight porosity which causes seepage, but not for gross shrinkage. Flow welding should be used when the foundry knows the extent of the defect. Welding is the most important form of repair, but the welder must know what he is doing. A poor welder may do a repair job which hides a defect but doesn't prevent it from doing damage in service. Each nonferrous metal presents its own problem and requires an appropriate welding technique.

**Modern Sand in the Mold** — By Thomas E. Barlow, International Minerals & Chemical Corp., Skokie, Ill. Laboratory tests on sand must be interpreted properly to be effective. Lab tests are made with standard conditions, but the mold itself usually is subjected to wide variations in ramming throughout its volume. Flowability and rammability cause wide variations in density of a mold, and all properties are affected. Essentially, therefore, lab tests are worthless unless they are intelligently interpreted and the interpretation correlated to practice. Each foundry should do only those jobs which fit its sand. The best type of mold is one which is hard and uniformly rammed.

**Foundry Practices for Naval Castings**—by William Baer, Bureau of Ships, Washington. Foundrymen get in trouble for these reasons: 1. They don't get all the facts. 2. They have too much confidence in their work—a factor which leads them to take chances. They should use good foundry practice and do what they know how to do. Suppliers to the Navy now are responsible for all inspection requirements. Naval inspection will look over only the records, not the castings themselves. Gross shrinkage is the greatest problem in Naval bronze castings. Castings in which it occurs cannot be impregnated and used. Foundrymen need to benefit by experience and by use of the material published to help them.

**New Core Processes**—by Anton Dorfmueller, Archer - Daniels-Midland Co., Cleveland. Recent new processes for coreroom application include the $CO_2$, air setting, shell core, and complete air setting processes. Their applications and their problems and solutions are of major importance if these tools are to create profits for foundries.

Major applications for the $CO_2$ process are medium-sized, low-production cores, particularly for aluminum and magnesium and certain difficult steel castings. The shell core process provides a tool for high and medium-production core work, particularly when complex design or close tolerances are a problem. The air setting process has found wide acceptance, especially in heavy job work, and can be applied basically to any core for which normal fabrication time would exceed a half-hour. The new air setting binders, which are designed to eliminate baking completely, are being introduced on a limited scale at the present time. They are used for the same applications as conventional air setting binders. This type of material also can be used as a mold facing where dry sand facings normally are required.

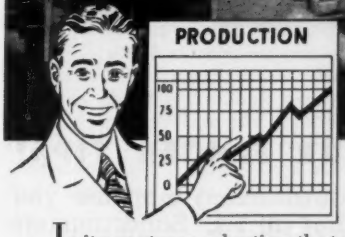
**Profit Dollars That Slip Away**—by Joseph B. Stazinski, Elmira Foundries, General Electric Co., Elmira, N. Y. Foundrymen should keep up with new developments, but should not buy something in a hurry, fail to try it out properly, and let it sit around idle. Changes in equipment, methods, and materials should be made when the new development is needed, will do what is expected, and can be justified costwise. Change is not always the only answer to a problem. Good practice and controls may be the proper course. No problem should be solved by doing more than is necessary. Use of manpower is an area where great saving can be made. Manpower should not be wasted, discipline must be maintained, work standards must be set properly, human relations should be good, and safe operation is necessary.

The conference banquet was held the first night of the meeting with Tom Dowd, traveling secretary of the Boston Red Sox, as speaker. A dinner and entertainment on the second night concluded the meeting.

---

Conference photographs are by Tim Saunders, Debevoise-Anderson Co., Boston.

# INCREASE FOUNDRY OUTPUT WITH EFFICIENT TRAMRAIL HANDLING




## 25% to 100% Greater Production Often Obtained

Is it greater production that you want? Are lower costs important? Would you like these advantages without enlarging your present plant? Then consider Cleveland Tramrail overhead materials handling equipment.

In many instances the installation of Cleveland Tramrail cranes, bridges, carriers, hoists, etc. have so cut handling time, speeded production and brought about other advantages, that 25% to 100% greater output is obtained with the same floor area.

Cleveland Tramrail is adaptable to all size and type foundries, and just as great relative savings can be made by a 10-man foundry as one employing 1000. The equipment is available for hand or electric operation, or various combinations thereof, to best serve the requirements.

Why not get the facts on the modern overhead Tramrail way of foundry handling? Learn first hand what it has done for hundreds of other foundries. This might well lead to an entirely new and profitable future course for your company.

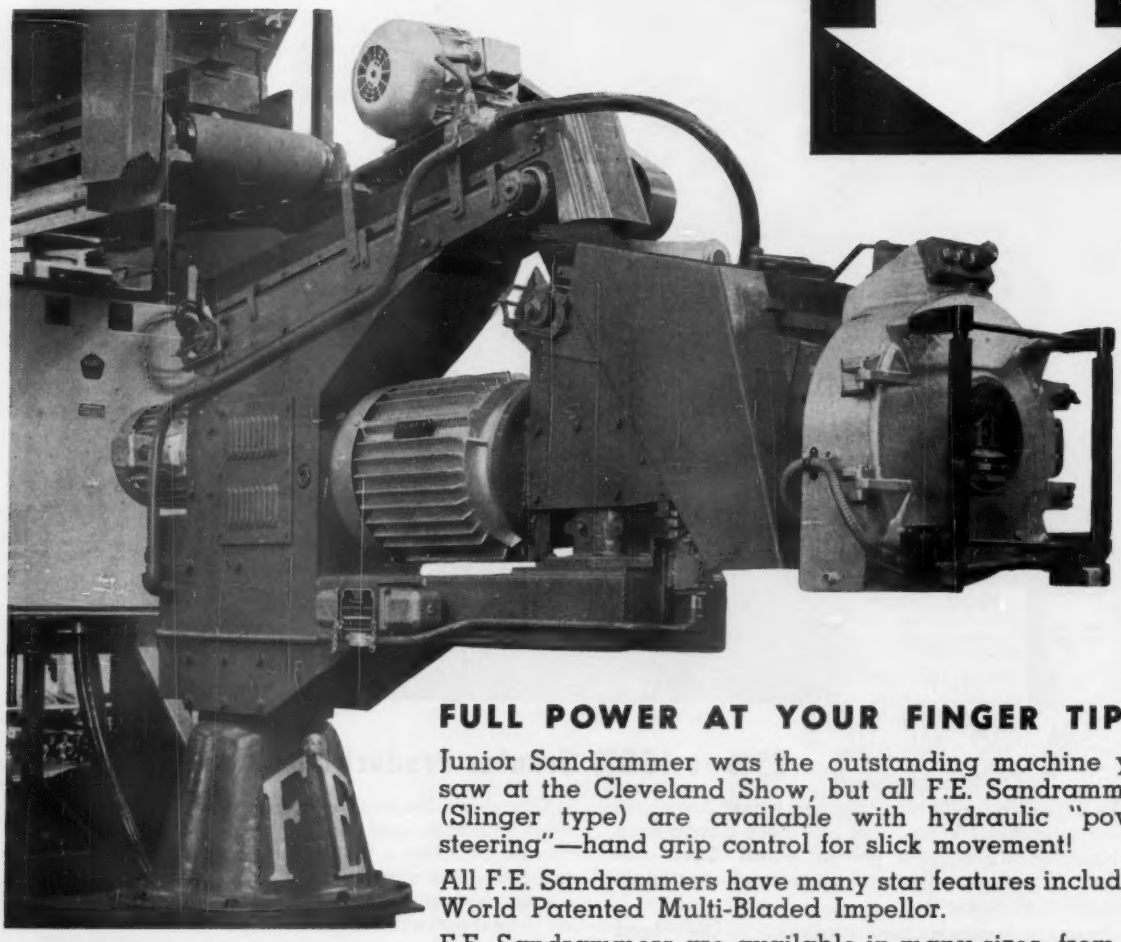
*GET THIS BOOK!*
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

**CLEVELAND TRAMRAIL DIVISION**
THE CLEVELAND CRANE & ENGINEERING CO.
*3832 East 283rd St.* *Wickliffe, Ohio*

**CLEVELAND TRAMRAIL**
**OVERHEAD MATERIALS HANDLING EQUIPMENT**


*Circle 635 on Page 51*

# POWER ASSISTANCE




## FULL POWER AT YOUR FINGER TIPS!

Junior Sandrammer was the outstanding machine you saw at the Cleveland Show, but all F.E. Sandrammers (Slinger type) are available with hydraulic "power steering"—hand grip control for slick movement!

All F.E. Sandrammers have many star features including World Patented Multi-Bladed Impellor.

F.E. Sandrammers are available in many sizes; from 18" to 24" diameter head, and radius as required.

Mail us for 12 page bulletin #150/NA.
Ask our Sales Engineer to visit your plant.

F.E. Sandrammers are covered by U. S. Patent Nos. 2555914, 2568536, 2752647, 2772453, Canadian Nos. 439480, 503830, 515510, 533743, 546295. British Nos. 570641, 663318, 657197, 714053, 714064, 714065, 742745. Patents granted or pending in other Industrial Countries.

FE
FOR
FOUNDRY EFFICIENCY

## F. E. (NORTH AMERICA) LTD.

TELEPHONE:
BELMONT 3-3227

47 ADVANCE ROAD, TORONTO 18, ONTARIO

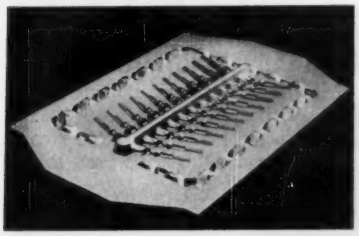
TELEGRAMS:
EQUIPMENT, TORONTO

# FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 165

## PATTERN PLATES

Pressure cast pattern plates are made with the Gefscorp nonshift sand lock developed by General Foundry Services Corp., Oakland,



Calif. The sand lock consists of a series of small offsets around the border of the pattern plate. Each offset is about 1 in. long and extends alternately into the cope and the drag. The lock is reported to give unexcelled freedom from mold handling shifts. It is available from the company's Cleveland and Chicago foundries. — **Scientific Cast Products Corp.**, 1390 E. 40th St., Cleveland 3, Ohio.

For More Details Circle No. 420—Page 165

## SELF-CURING BINDER

Corovit self-curing binder 7203 and Accelerator 7204 are for foundry core applications when extreme dimensional tolerances are desired. Both are synthetic resins. The binder is reported to mix rapidly with sand and to provide sand flowability and workability. It allows a setup time that is easily controlled, especially under hot, humid conditions.

The accelerator is a dry powder compounded to provide extremely rapid auto-oxidation during cold weather. It reacts favorably with the binder at sand temperatures lower than 40° F and can be used effectively in quantities of 2 to 5 per cent under normal ambient temperatures. — **Reichhold Chemicals Inc.**, RCI Bldg., White Plains, N. Y.

For More Details Circle No. 421—Page 165

## ABRASIVE WHEEL

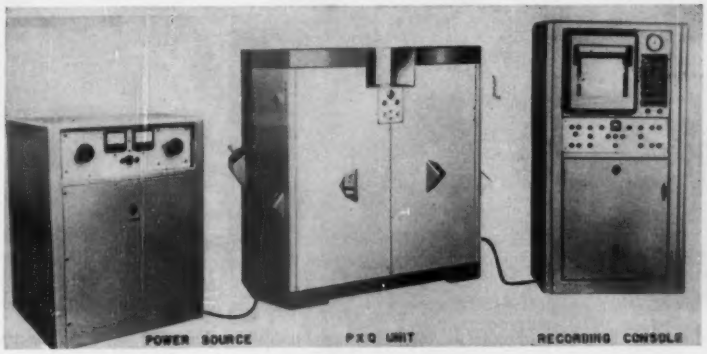
Double XX depressed center abrasive wheel is for weld grinding and general offhand use on portable disc-type sanders and right-angle grinders. It contains the maximum amount of abrasive cutting particles and is said to be extremely fast cutting. It is a rigid-type, resinoid bond wheel doubly reinforced. The new wheel falls between the company's other depressed center wheels—Fibrex for lighter jobs and Simex for heavy-duty use.—**Simonds Abrasive Co.**, Tacony & Fraley Sts., Philadelphia 37, Pa.

For More Details Circle No. 422—Page 165

## CONDUCTOR SYSTEMS

Hevi-Bar 1000-amp mobile electrification systems are designed for heavy-duty applications. They meet all straight-run requirements and are particularly suited for cranes,

## Unit Makes Quantitative Analysis in 2 Minutes



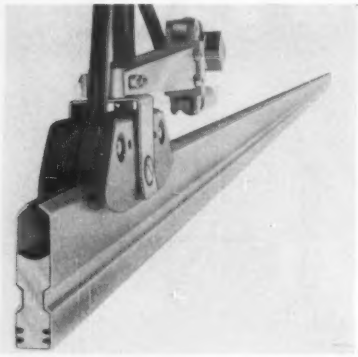

Direct-reading x-ray fluorescence instrument called Production X-Ray Quantometer reportedly analyzes all elements above atomic No. 11. Simultaneous analysis of up to 22 elements in the wavelength range 0.34 to 10.2 A is provided from a single sample.

The unit uses the principle of analyzing fluorescence caused by bombardment of the sample with high-intensity x-rays. Each element emits fluorescent radiation at a characteristic wavelength. Measurement of the intensity of this radiation by various detectors provides accurate quantitative analysis of the sample.

Through a ratio recording system, the instrument supplies permanent, inked records showing concentrations of elements analyzed. The analytical system is composed of three parts—power source, spectrometer, and recording console. — **Applied Research Laboratories Inc.**, P. O. Box 1710, Glendale 5, Calif.

For More Details Circle No. 445—Page 165

gantries, and similar uses. Either open (bare conductor) or enclosed (safety) systems can be installed. The three basic components of a



system are aluminum conductor bars, sliding shoe trolley collectors, and hanger clamps. For the safety-type systems, the conductor bars are enclosed in PVC plastic covers.

Contact surfaces of the aluminum conductors are heavily clad with a hard, high-melting point material claimed to give permanent protection against oxidation and arcing. The conductor bars are available in 10 and 20-ft sections and are welded together in the field. Systems can be engineered on the job by plant mechanics, according to the manufacturer.—**Insul-8-Corp.**, 1369 Industrial Rd., San Carlos, Calif.

For More Details Circle No. 423—Page 165

## CARBON PRODUCTS

Company now is distributing a complete line of welding carbon products through its retail sales outlets. The line includes welding electrodes, carbon plates, carbon rods, and carbon paste. The company also manufactures and distributes metal removal torches and special cutting and gouging electrodes for use with the torches.—**Arcair Co.**, Lancaster, Ohio.

For More Details Circle No. 424—Page 165

## POWER ATTACHMENT

Powr-Wheel is an attachment which converts hand-propelled equipment to powered propulsion. Models are available both for permanent attachment or for use with a fleet of trucks. They include two 3000-lb capacity units and two 8000-lb capacity units. In both capacities, one model is for permanent installation on any unit which has its own battery, and the other is for use with any number of batteryless trucks. The 8000-lb models feature fluid drive and deadman brakes. The 3000-lb capacity units offer centrifugal clutch or fluid drive and mechanical brakes operated from the control handle. All models travel at 2½ mph.—**Vanguard Engineering Co.**, 1908 E. 66th St., Cleveland 3, Ohio.

For More Details Circle No. 425—Page 165

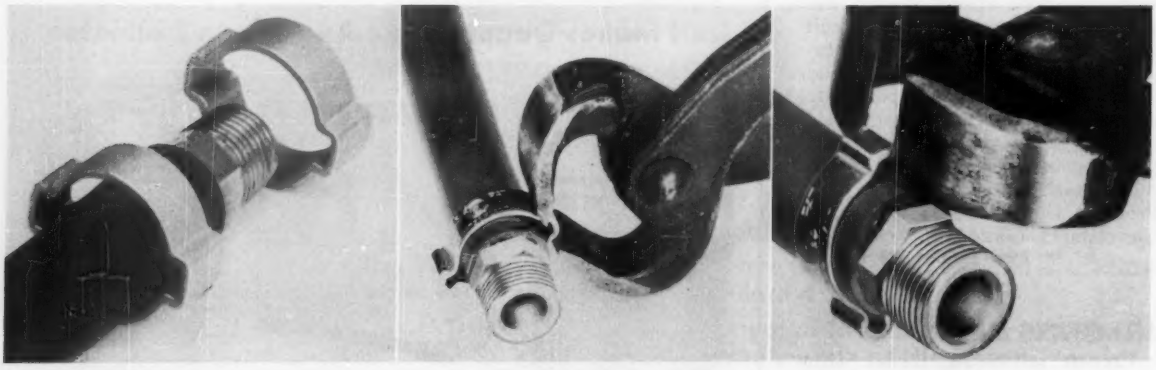
## CHEMICAL FLUXES

Company has added chemical fluxes to its present line of aluminum and zinc alloys and related chemicals. Basic types of foundry fluxes offered include cleaning, degassing, permanent mold, and grain refining materials. — **Alloys & Chemicals Mfg. Co.**, 4365 Bradley, Cleveland, Ohio.

For More Details Circle No. 426—Page 165

## DIE SHARPENING MACHINE

Machine sharpens, polishes, and deburrs sharp edges of cutting dies and polishes inside or outside contour surfaces. It also is used to re-



*Left,* with coupling inserted in hose, clamps are slipped on. *Center,* lugs are crimped with pincers. *Right,* same pincers snip off lugs to remove the clamps

# Clamp Simplifies Hose Maintenance

O-SHAPED metal Circle Clamps for use on air, gas, water, and pneumatic conveying hose lines can be installed on the spot with a pair of ordinary 8-in. pincers. Downtime thus is kept at a minimum.

When a hose breaks, for example, the broken end is cut off, the coupling reinserted, a clamp installed with pincers, and the hose reconnected. Clamps are round with either two or three U-shaped lugs or folds. Sizes run from ¼ to 2⅝ in. ID., and those over 1¾ in. have three lugs.

Clamps are slipped on the hose, and the lugs are crimped with the pincers. When they must be removed, the same pincers are used to snip them off. Each clamp is marked during manufacture with the nominal diameter it can clamp. Standard clamps are supplied in SAE 1010 steel with an electroplated cyanide zinc finish. Other materials can be supplied on request to fit individual requirements.—Supplied by Circle Clamp Corp., 39 Broadway, New York 6, N. Y.

For More Details Circle No. 446—Page 165

move flash from small die castings. The unit employs a 42-in. endless abrasive belt 1 in. wide at a speed of about 2600 fpm. Pressure can be applied against a removable solid backing or spring tension behind the belt.

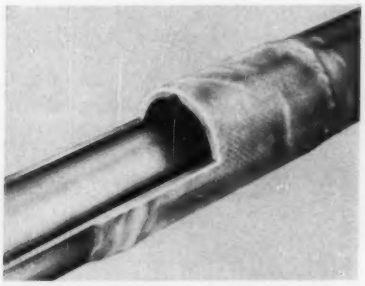
Power source is a ½-hp, 60-cycle, single-phase, 3400-rpm, dust-enclosed motor. A switch is provided for forward or reverse operation. Pulleys have permanently sealed ball bearings.—**Chicago Cutting Die Co.**, 2333 Nelson St., Chicago 18, Ill.

For More Details Circle No. 427—Page 165

## EPOXY-BASED SEALER

An epoxy-based compound called Homalite 345 is said to make possible quick emergency repairs of metals, plastics, wood, concrete, and other materials. It is reported to adhere to any clean, dry material.

A coating of the compound is applied to the material to be repaired, a layer of glass cloth is pressed into



the coating, and another coating of the compound is applied. Additional layers of glass cloth and compound can be applied for extra strength.

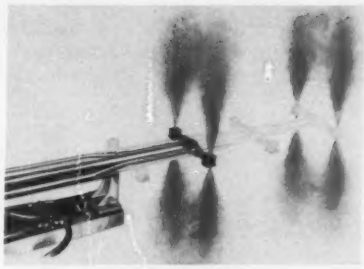
The product has high dielectric properties, seals against pressure or vacuum, and is unaffected by temperatures up to 150° F. It is highly resistant to impact, abrasion, or corrosion. — **Homalite Corp.**, 15 Brookside Drive, Wilmington 4, Del.

For More Details Circle No. 428—Page 165

## RECIPROCATING SPRAYER

From one to five spray nozzles mounted on the automatically triggered arm of a reciprocating sprayer plunge in and out of position at high speed. They spray in almost any volume, pattern, and force at one or more points of either outward or return strokes or both.

Spray nozzles can be mounted in any position or combination of positions or angles. Different nozzle tips and individual adjustments can provide spray patterns, either inter-



mittent or continuous, of almost any area, volume, duration, and density.—**Renite Co.**, Columbus 1, Ohio.

For More Details Circle No. 429—Page 165

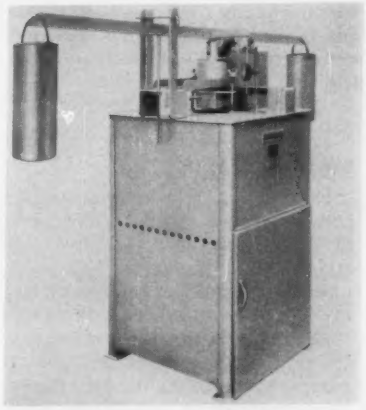
## SOLENOID-OPERATED VALVE

Solenoid-operated S-3C-S valve is 1 in. thick, 3 in. wide, and 6 1/16 in. high. Easily mounted on machines even when space is limited, valves of this type can be used with air or oil, pressures to 125 psi, and temperatures to 150° F. They are furnished tapped for either ⅛ or ¼-in. pipe connections and are rated at 300 cpm for continuous operation and at up to 700 cpm for intermittent service on air at 120 psig. Valves can be manifolded together easily without special parts. Eight valves can be operated simultaneously from a single air supply or up to 16 valves simultaneously from two lines.—**C. B. Hunt & Son Inc.**, Salem, Ohio.

For More Details Circle No. 430—Page 165

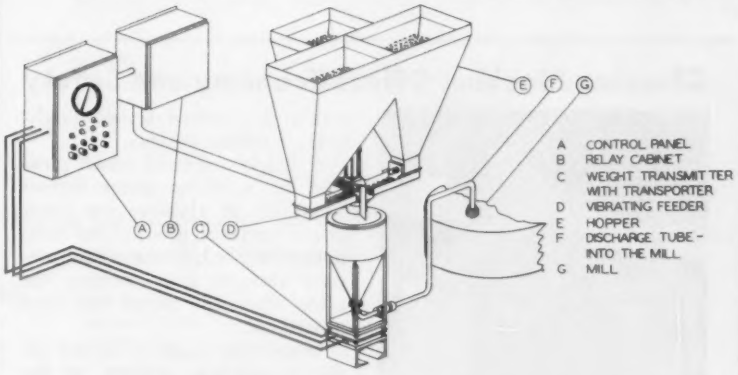
## COKE STRENGTH TESTER

Furnace is for the determination of compression strength of foundry coke at high temperatures. It is claimed to report accurately the



strength of coke at temperatures encountered in the tuyere zone or in the high-temperature zone adjacent to it. The furnace heating zone con-

## Sand Additives Are Handled Automatically




Weighing Bondadder automatically selects, weighs, and delivers a preset weight of any number of dry foundry sand additives into a common weighing hopper-transporter, and with low-pressure air moves them to the mixer. Designed for fully automatic, semiautomatic, or manual operation of each step in the cycle, it lends itself to tying into any existing automatic cycling of mixer operation.

The weighing hopper-transporter is mounted on an accurate pneumatic weighing platform. Bonds are fed into the transporter by vibratory feeders, each of which successively delivers a bond until a preset weight is reached. When the mixing cycle calls for the additives, the transporter is closed by an air cylinder and is pressurized to deliver the additives to the mixer.—**Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 447—Page 165

sists of a hollow silicon carbide tube. An automatic indicating or recording pyrometer controls and determines temperature. The coke sample is cut to a predetermined size and placed on a pedestal within the tube. The furnace is brought up to 3000° F under a nitrogen atmosphere, and increasing pressure is applied to the sample, through a counterbalanced pressure rod, until it collapses. Pressure is applied to the rod by a hydraulic mechanism which records the weight or by the addition of lead shot to a container on a lever arm.—**Hevi-Duty Electric Co.**, Milwaukee 1, Wis.

For More Details Circle No. 431—Page 165

## MANUAL VALVES

Reverse-acting, knob-controlled, panel-mounted manual valve for up to 200-psi pneumatic and hydraulic and vacuum service is said to be especially suited for emergency control applications where a fast push-type action is more desirable than the pull-type. Reverse action is imparted by a spring return end section mounted on any of the firm's standard two, three, or four-way manual valve bodies in sizes from ¼ through ¾ NPT. Open-end or piped exhaust three and four-way types are available.

These valves feature one-piece Navy M bronze bodies hard-chrome plated stainless steel stems, and straight-through construction. Valves for hydraulic or vacuum service are fitted with O-ring packers said to resist heat and hydraulic

fluids. Pneumatic valves employ molder Hycar "OU" packers which are reported to be unaffected by grease, oil, air, or water.—**Valvair Corp.**, 454 Morgan Ave., Akron 11, Ohio.

For More Details Circle No. 432—Page 165

## GAS-POWERED FORK TRUCKS

Company has added two heavy-duty models to its line of gas-powered fork trucks. Models G-30H and G-40 have 3000 and 4000-lb capacity respectively at 24-in. load centers. Both feature power steering and pneumatic tires as standard equipment. Clutch is guaranteed for 12 months. Other features include centrally mounted chain and hoist cylinder for maximum visibility, hydraulic brake, and neoprene-mounted mast. Latter absorbs shock and eliminates rotating bearings, sleeve mounting, and lubrication points. — **Mercury Mfg. Co.**, a subsidiary of Pettibone Mulliken Corp., 4710 W. Division St., Chicago 51, Ill.

For More Details Circle No. 433—Page 165

## INTERCHANGEABLE COUPLINGS

Quick-connect and disconnect couplings are interchangeable with those of other makes. They are available in male, female, hose stem, and reusable hose end connections in ¼, ⅜, ½, and ¾-in. sizes with working pressures up to 10,000 psi. One-hand operation is a design feature. Couplings lock automatically without twisting or turning, and the locking mechanism is said to make a positive, leakproof connection resistant to impact or rough handling. Full 360-degree swivel action reduces pneumatic tool operator fatigue and eliminates hose kinking. — **Perfecting Service Co.**, 332 Atando Ave., Charlotte 6, N. C.

For More Details Circle No. 434—Page 165

## FERROALLOYS

Two high-chromium, low-carbon ferroalloys contain a minimum of 75 per cent chromium and maximums of either 0.015 or 0.025 per cent carbon. They facilitate production of low carbon stainless steels and high-temperature alloys without extended furnace operation to remove carbon. Higher chromium content means smaller alloy additions and less cooling of metal. In addition, smaller amounts of alloy materials need be received, handled, and inventoried.—**Vanadium Corp. of America**, 420 Lexington Ave., New York 17, N. Y.

For More Details Circle No. 435—Page 165

## CURRENT COLLECTOR

Current collecting system for cranes and other electrified machines has been in use in Europe for more than 40 years. Three major components make up the system: Copper head steel rails as conductors, pantographs with carbon shoes as collectors, and high-strength steatite insulators.

Use of carbon sliding contacts on

## Cleaning Machine Offers Economy and Safety

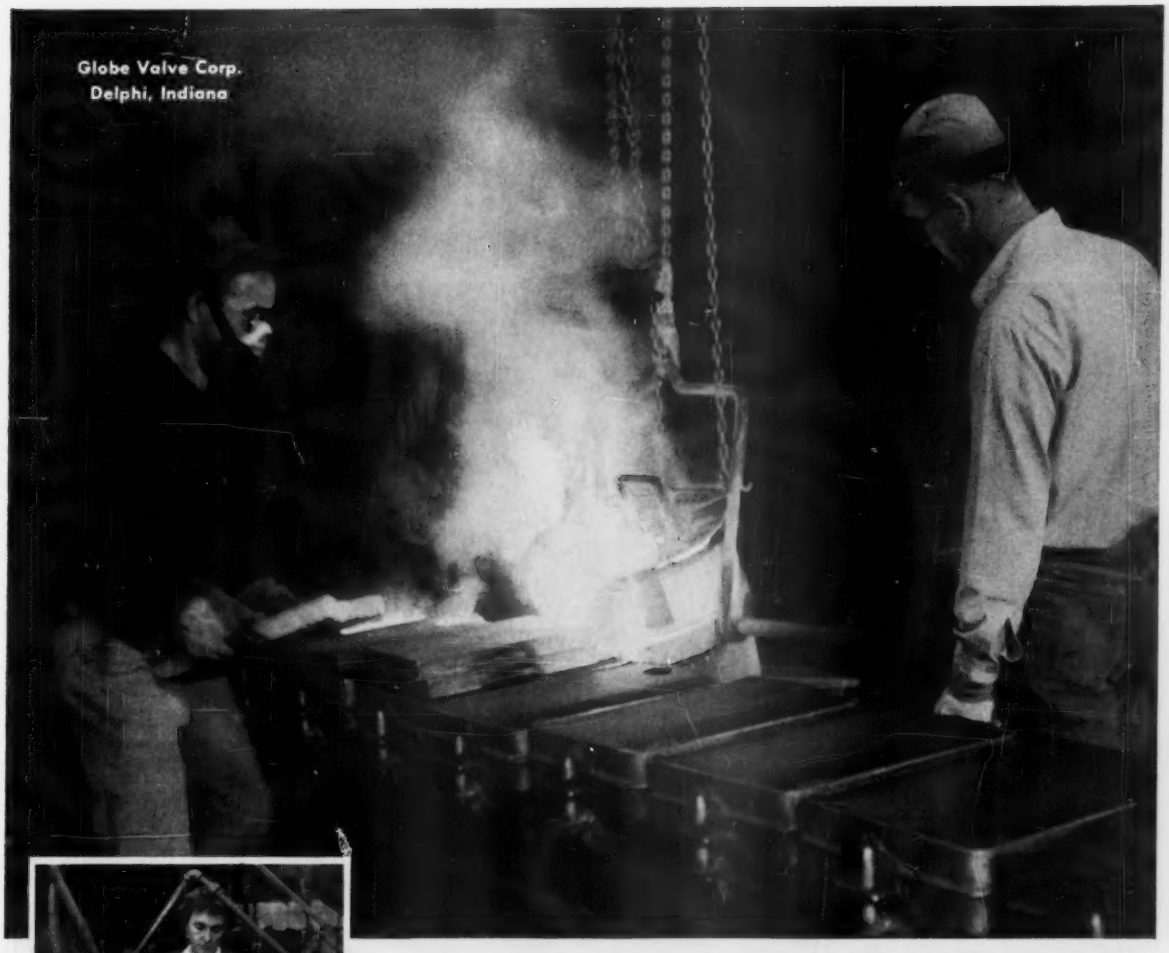
Rotoblast Table-Room unit cleans all types of work in foundries that require a flexible machine for a wide range of operations. A 6-ft model, it is capable of cleaning castings which weigh up to 5000 lb and are up to 72 in. in diam by 36 in. high. A cast labyrinth abrasive sealing system makes the cabinet abrasive-tight without rubber gaskets.

A single overhead wheel powered by a 30-hp motor throws 50,000 lb of abrasive per hour. Power-operated guardplates positioned in front of the wheel prevent abrasive from striking the table when the motor has been turned off.

When the wheel is turned on, the guardplates retract to the original position. In addition, a safety switch automatically turns off the motor when the doors of the unit are opened, the plates then go into position in front of the wheel.

For maximum abrasive efficiency, a self-contained elevator and an extra-large capacity pneumatic separator continuously clean used abrasive for recirculation to the wheel.—**Pangborn Corp.**, Hagerstown, Md.

For More Details Circle No. 448—Page 165



**The Air Pressure Test** is given to all Globe castings. Here, casting is subjected to 160 pounds of pressure. Others are given similar test under water. All must be perfect.

**Intricate Core** is typical of many produced by Globe Valve Corp. using Cities Service Delco #60 Core Oil. Here, the oil's green strength is particularly important.

# Production up 30% in two years

**Using Cities Service Delco Core Oil, Globe Valve Corp. sets quality standard that sends sales soaring.**

With production up 30% during the past two years, Globe Valve Corp., makers of GERBER brand plumbing fixtures, is now pouring 11-million brass castings a year!

Key to this outstanding success is strictest quality control . . . control that extends to the nearly nine million cores required in this operation and their priceless ingredient, core oil.

Here, Globe gets the quality it demands from Cities Service Delco #60. Not in any vague sense, but in four easily demonstrable characteristics:

- Fast bake allowing high rate of output, greater total productions.
- Good collapsibility
- Good storage qualities
- Good green strength, so important with intricate cores.

Wherever production schedules are tight . . . wherever quality is paramount . . . wherever cores are difficult to make . . . that's where you'll find Cities Service Delco Core Oils. Get the facts from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Co., 20 North Wacker Drive, Chicago 6, Illinois.

CITIES SERVICE

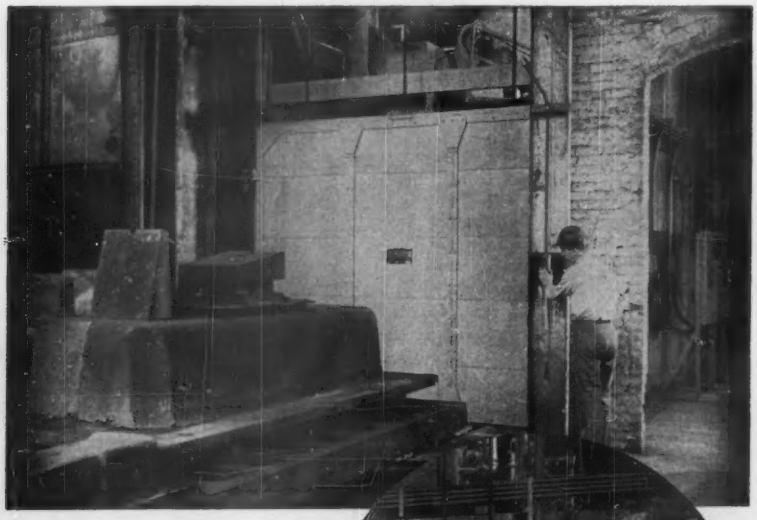
QUALITY PETROLEUM PRODUCTS



Circle 637 on Page 51

# here's another **carl mayer** installation...

## *Cutting Costs for its Owner*



**CAR TYPE CORE AND MOLD OVEN**

*Above—A difficult engineering and installation problem solved by Carl Mayer because the oven filled this space completely. This modern oven, with patented down draft heating system and motor operated lift door, replaced an obsolete brick oven.*

**RACK TYPE CORE OVEN**

*Right—Installed at rear of mold oven to form an efficient, flexible combination. Miscellaneous cores are uniformly baked with modern, automatic controls. Operation is efficient and economical.*

Carl Mayer's outstanding engineering and design features sold the steel mill where these ovens are now in operation. They incorporate the exclusive Carl Mayer recirculating heating system and special triple slotted panel construction.

Heat loss is reduced up to 1/3, and fuel savings up to 50% over old conventional methods are possible. Temperature uniformity is guaranteed.

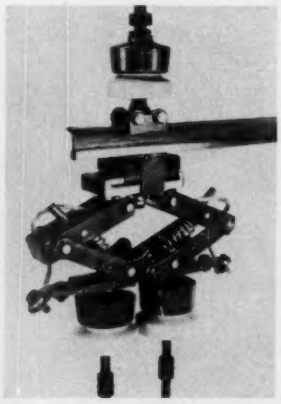
Consult Carl Mayer now for any type foundry oven or furnace, large or small, and for any purpose. Write for Bulletin 53-CM.

THE **carl mayer** CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories


the copper head steel rail conductors is claimed to eliminate possibility of corrosion of the rail contact surface. In addition, the carbon provides a protective coating

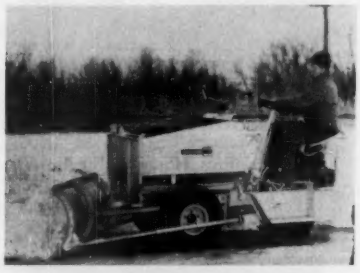


for the copper plus a cleaning effect. Spring-propelled, scissors-type construction gives the pantograph collectors full freedom of action. Steatite insulators are electrically the equivalent of porcelain, but are said to be stronger structurally.—**Ringsdorff Carbon, Pittsburgh Div.**, P. O. Box 22, East McKeesport, Pa.

For More Details Circle No. 436—Page 165

## SNOWPLOW ATTACHMENT

Snowplow attachment for the company's M30 power truck is designed to roll snow to either side and has lateral grooves in the moldboard to prevent packing. Removable cutting edge can be reversed



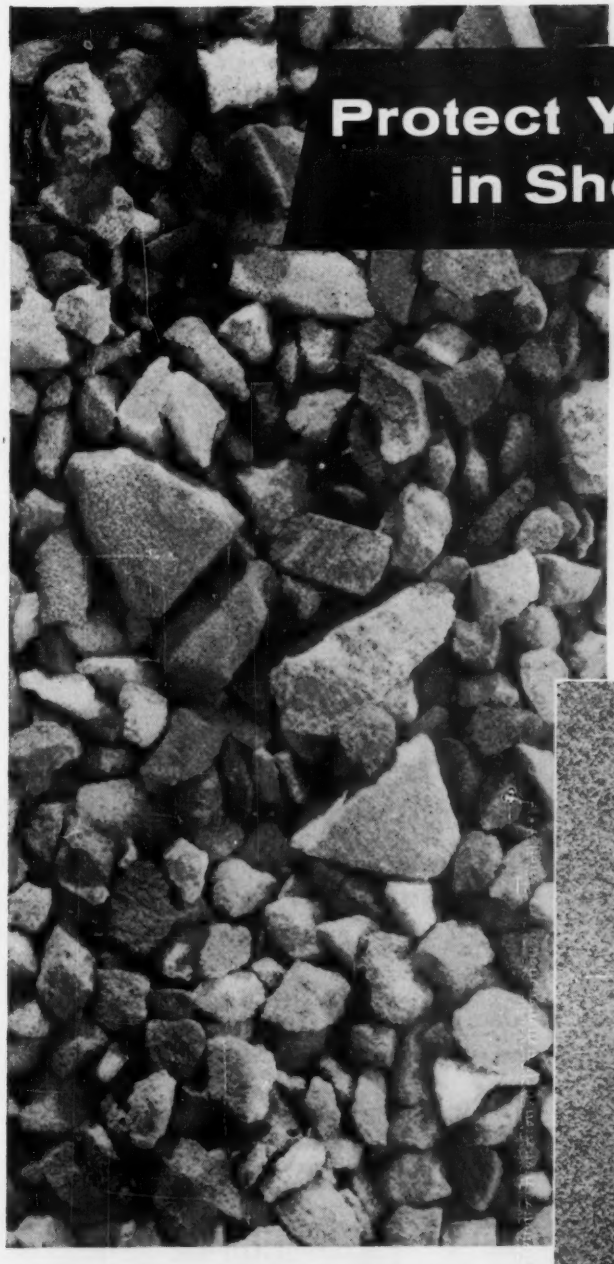
for double wear, and rubber-mounted outside tubular push arms reduce shock and vibration.

The truck itself is a 1½-ton bulk material carrier. It has a hydraulic torque converter drive which is said to give smooth acceleration and power flow and to reduce stalling in drifts or under heavy loads.—**Prime-Mover Co.**, Muscatine, Iowa.

For More Details Circle No. 437—Page 165

## FIRE-RESISTANT CLOTHING

Fyre-Free fire-resistant clothing is made of permanently flame-



# Protect Your Investment in Shell Mold Sand...

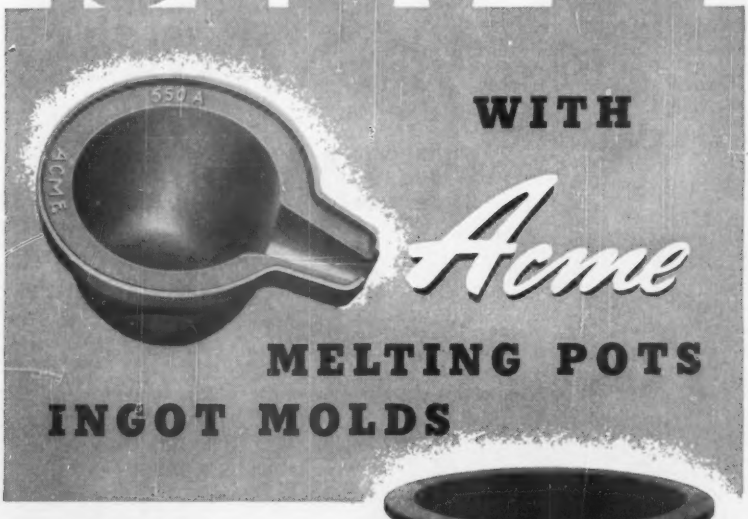
## ..with a NICHOLS RECLAMATION SYSTEM

**Get the greatest possible use from your sand. Users report shell mold and other sands reclaimed to "good-as-new" condition with a Nichols High Temperature Reclamation System. Illustrated above: Used shell mold sand—At right: the same sand reclaimed with a Nichols System.**

**NICHOLS**
**Engineering & Research Corporation**
70 Pine St., New York 5, N. Y.
3513 N. Hovey St., Indianapolis 18, Ind.
405 Montgomery St., San Francisco 4, Calif.
1477 Sherbrooke St., W., Montreal 25, Canada


Circle 639 on Page 51

# SAVE




WITH *Acme*

MELTING POTS
INGOT MOLDS

*Designed by*
FOUNDRYMEN...
*for* FOUNDRYMEN

**You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.**

*Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.*

*Acme* FOUNDRY CO.

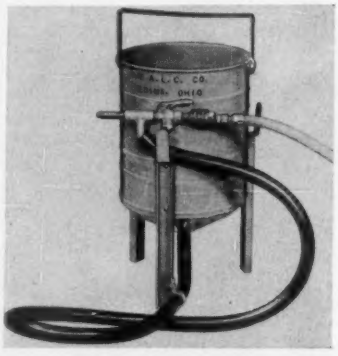
2502 22nd St. • DETROIT 16, MICH. • *Phone* TAshmoo 5-2404


proofed, 100 per cent cotton cloth. The material weighs about 11½ oz per square yard and clothing made from it is said to last up to three times as long as clothing made of untreated fabric. It is mildew resistant and can be laundered or dry cleaned as many as ten times without loss of its flameproof properties. The material meets American Standards Association requirements for flameproofed fabrics. Clothing is available in a complete line of sleeves, cape sleeves with and without bibs, regular and split-leg aprons, overalls, coats, coveralls, hip leggings, and pants.—**American Optical Co.**, Safety Products Div., Southbridge, Mass.

For More Details Circle No. 438—Page 165

## SAND BLASTER

Sandy Jet blaster is said to remove rust, paint, carbon, dirt, and weld scale down to the bare metal



easily and quickly. It operates at 100 to 185 psi, and a separate blast room is not required. Cardboard keeps the abrasive confined. The tank holds 12 qt of abrasives such as silica sand, metal shot, nut shells, and aluminum oxides.—**A.L.C. Co.**, 646 Oak St., Medina, Ohio.

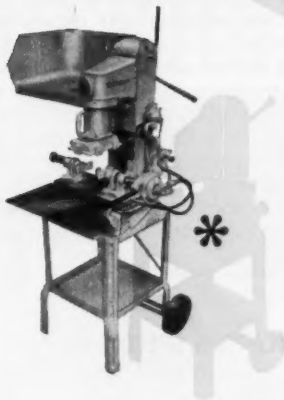
For More Details Circle No. 439—Page 165

## COMPRESSED AIR

New method is claimed to provide compressed air which is dried, cooled, and cleaned for use. It uses two machines in series—the company's Aero aftercooler and its compressed air chiller.

In the first stage, the aftercooler receives hot air from the compressor and reduces its temperature to about that of the atmosphere by evaporative cooling. An oil separator removes moisture and oil or dirt condensed from the condensed air.

In the second stage, the air chiller uses refrigeration to cool and further dry the air. A recirculated water spray in a closed system is



## NOW FLEXIBLO HAS A PARTNER

## IT'S THE

# FLEXIGAS

*In 7 Sizes For Low-Cost $CO_2$ Curing of Molds and Cores*

**Each size Flexigas completely adjustable to any mold or core within its range.**

**Fully automatic operation—push-button control.**

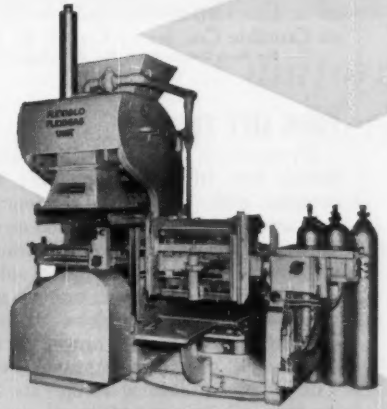
**Each Flexigas is compact and rugged—built to operate with minimum maintenance.**

**Use *individually* or in complete Flexiblo-Flexigas *units*.**

**Economical operation—uses just the right amount of $CO_2$—no more, no less. High quality and uniformity are assured with minimum cost operation.**

**CB5 FLEXIGAS**

**A complete range of Flexigas units to handle any size mold or core to 400 lbs.**

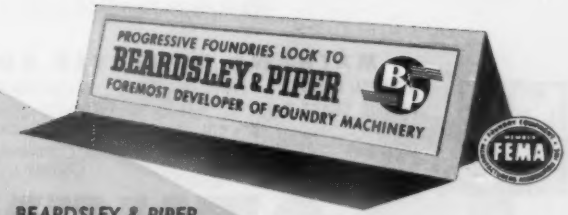


**SEVEN FLEXIBLO-FLEXIGAS UNITS—CAPACITIES TO 400 LBS.**

| | | |
|---|---|---|
| CB5 | FLEXIBLO-FLEXIGAS | 4½ lbs. |
| CB10 | FLEXIBLO-FLEXIGAS | 20 lbs. |
| CB12 | FLEXIBLO-FLEXIGAS | 30 lbs. |
| CB15 | FLEXIBLO-FLEXIGAS | 70 lbs. |
| CB18 | FLEXIBLO-FLEXIGAS | 125 lbs. |
| CB20 | FLEXIBLO-FLEXIGAS | 125 lbs. |
| CB30 | FLEXIBLO-FLEXIGAS | 400 lbs. |

*Note: Flexiblo-Flexigas units, except the CB5, are available as blow-squeeze-gas units.*

## HIT OF THE CLEVELAND FOUNDRY SHOW




**BEARDSLEY & PIPER**

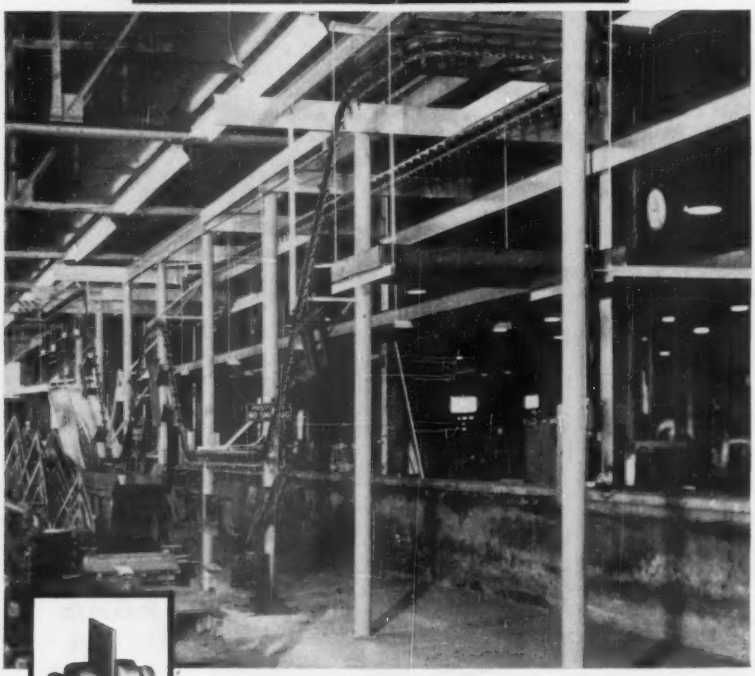
*Division Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois*



Circle 641 on Page 51

A NEW LIGHT-DUTY TROLLEY CONVEYER . . . ENGINEERED AND STANDARDIZED BY

MATHEWS



*A #232 Trolley Conveyer Applied for painting, drying and storage of miscellaneous parts.*

This light-duty Trolley Conveyer has several features which make it a leader in the field of overhead conveying. It is comparatively easy to install, with hanger-rod and angle hanger supports available to meet any supporting requirements. Standard turns, vertical bends, and takeup assemblies are made in sizes and types to fit even the most difficult layout.

The drive units have a wide range of capacities and horsepowers, with conveyer speeds ranging from one to fifty feet per minute.

***The #232 wheel was specifically designed for trolley conveyer service*** and is an outstanding performer. This equipment is priced reasonably and is available from stock, being assembled from standard parts throughout.

*Write for Bulletin T-58 today.*

MATHEWS CONVEYER COMPANY

GENERAL OFFICES . . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MATHEWS

(Member Foundry Equipment Manufacturers Association)

chilled by spraying over coils in which the refrigerant is expanded. The chilled spray drenches the compressed air coil and brings heat and moisture down to specification. A typical installation produces 45-degree air at 90-lb pressure needing only 5 tons refrigeration for 900-cfm free air. Air moisture is 0.065 lb per 1000 cu ft.—**Niagara Blower Co.**, 405 Lexington Ave., New York, N. Y.

For More Details Circle No. 440—Page 165

## LUBRICATING SPEED GUN

Lubricating speed gun for all types of equipment employs sealed, disposable cartridges which contain either graphite cup grease or non-

graphited ball and roller bearing grease. It develops 8000 lb of pressure and reportedly is nonleaking. An extra-long piston delivers more grease per stroke. Dirt, moisture, abrasives, and harmful chemicals cannot contaminate the grease or damage equipment. Cartridges contain 14½ oz of lubricant.—**Graphite & Lubrication Div., Joseph Dixon Crucible Co.**, Jersey City 3, N. J.

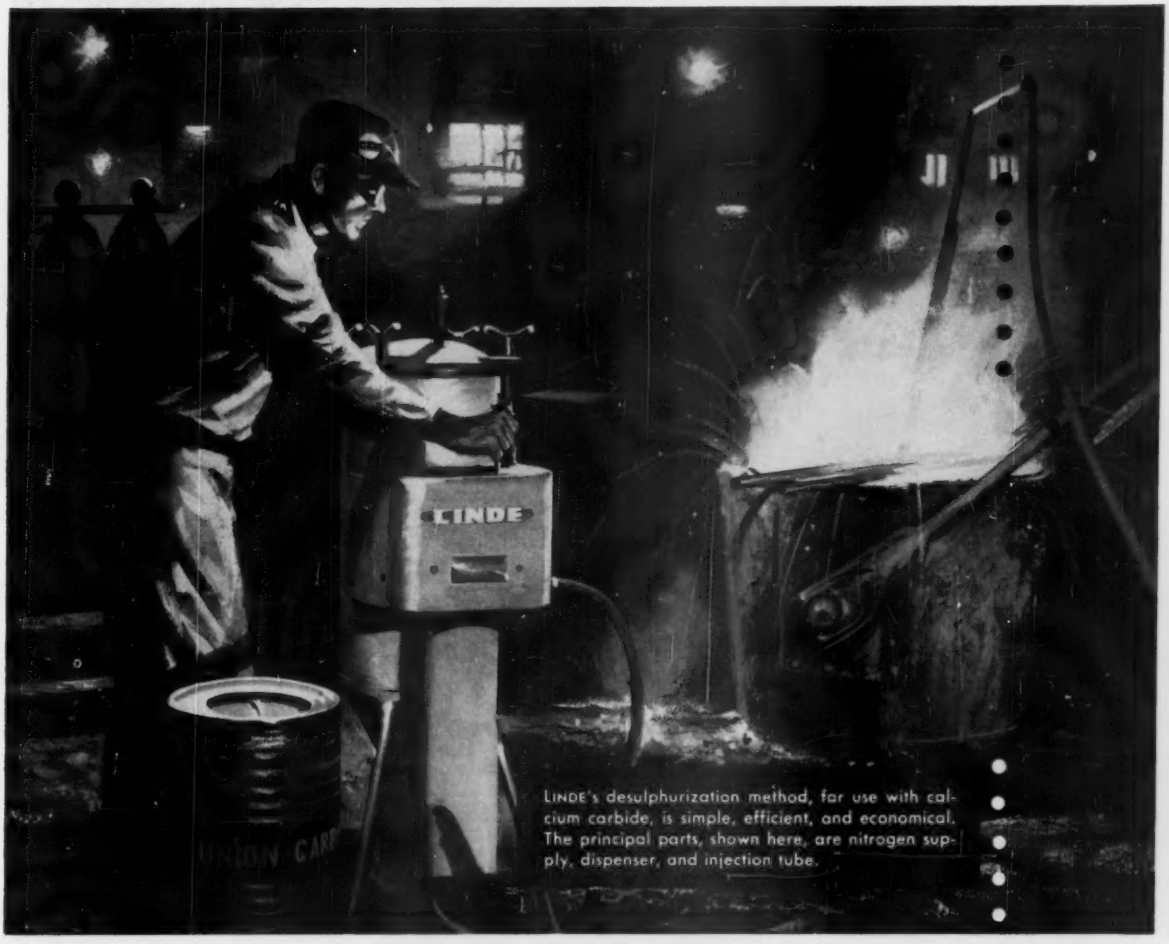
For More Details Circle No. 441—Page 165

## FORK LIFT TRUCKS

Dynamotive gas-powered, electric-driven fork lift trucks are said to provide high operating efficiency, low operating cost, and maximum safety. The gas engine transmits its power through a variable voltage generator to a matched dc series wound electric drive motor, forming a synchronized power package which supplies instant power. The engine is claimed to operate at its most efficient speed at all times and to save up to 30 per cent in fuel costs.

This drive principle eliminates clutch, fluid coupling, and fluid torque converter or multiple speed transmission. Capacities of trucks range from 4000 to 10,000 lb with lifting heights to suit all applications. Trucks travel at 8.5 mph and lift 4000-lb loads up to 75 fpm.

# DESULPHURIZATION...




LINDE's desulphurization method, for use with calcium carbide, is simple, efficient, and economical. The principal parts, shown here, are nitrogen supply, dispenser, and injection tube.

## *You get uniform results with Metallurgical Carbide from* LINDE*

In the foundry, you can produce high grade iron only by making sure you use metal with a low sulphur content. As a desulphurizing agent, metallurgical calcium carbide assures *uniformity* in the metal you produce. You know in advance that by adding a certain amount of carbide you remove a certain percentage of sulphur. Because metal specifications can be met efficiently and economically with carbide, you eliminate any need for wasteful "trial and error" methods.

Linde's method of mixing UNION calcium carbide and molten iron is simple and sure. A stream of fine mesh carbide and nitrogen under pressure is forced from a dispenser through a hose. The graphite injection tube is immersed deep in the hot metal. The carbide blends evenly and thoroughly with the iron. Desulphurization with UNION calcium carbide creates no fumes, does not attack refractories. The LINDE equipment—nitrogen supply, dispenser, and injection tube—is easy to operate and maintain.

If you would like more information about LINDE's method of desulphurization, using calcium carbide, just call or write your nearest LINDE office. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

Linde
TRADE-MARK

UNION CARBIDE

The terms "Linde," "Union" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.


Circle 643 on Page 51

## To cut costs with conveyors

# Ask Standard

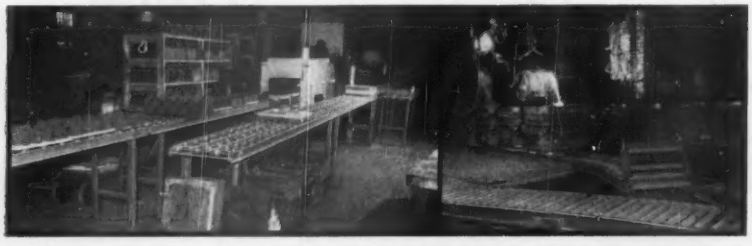
Starting at the molding machines, a complete Standard conveyor system, with transfer cars, is used to move flasks and molds to pouring and storage area, with return lines for empty flasks.

### Step up core making production with low-cost roller conveyors

Foundries are finding new savings in production with Standard's low-cost gravity conveyors. One user of national repute states these conveyors have "worked out just fine" for making and handling cores, before and through the oven.

Heavy-duty Standard foundry roller conveyors equipped with shielded bearings make possible smooth, efficient handling of molds and flasks.

Standard offers specialized experience of more than 50 years of designing and building foundry and mill conveyors. For any conveyor need, contact STANDARD CONVEYOR COMPANY, General Offices: North St. Paul 9, Minnesota.



*Left*: simple, low-cost Standard gravity conveyors speed core making and handling, before and through oven. *Right*: roller conveyors carry molds to the pouring floor.

*Send for Standard's special catalog — a valuable reference book illustrating and describing various conveyor installations in leading foundries. Ask for Bulletin 68 — address Dept. N-12.*

Standard GRAVITY & POWER CONVEYORS

OVER 50 years of conveyor experience

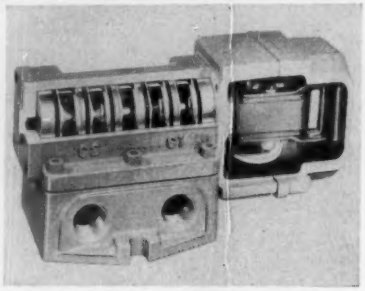
*Sales and Service in Principal Cities*


They will start and stop on 28 per cent ramps with a full load.—**Automatic Transportation Co.**, 149 W. 87th St., Chicago 20, Ill.

For More Details Circle No. 442—Page 165

## AIR CONTROL VALVES

Line of four-way air control valves includes single and double solenoid operated models and single or double pilot (air) operated master valves available in 1/4, 3/8, 1/2, and 3/4-in. pipe sizes. They feature a "controlled expansion seal" which is claimed to provide positive sealing in all operating ranges from 28



in. of vacuum to 150 psig and to be characterized by extremely low breakout friction.

These valves employ a balanced, direct-operated spool which permits use of small, low-amperage solenoids for the direct operating force. Short spool stroke and direct operation make possible complete reversal of valve position in less than one electrical cycle.—**Air Valves Co.**, 22729 Hoover Rd., Warren, Mich.

For More Details Circle No. 443—Page 165

## COATED ABRASIVE PAPER

No Load coated abrasive paper now is available in several new grits and forms.

The new finishing paper includes silicon carbide "A" weight paper, grits 500 through 80, and heat treated garnet "A" weight paper, grits 280 through 180. Regular paper includes silicon carbide "C" weight paper, grits 180, 150, 120, and 100, and aluminum oxide "D" weight paper, grits 80 and 60. Sheets are available in the 9 x 11-in. full size and in cut sizes; discs in sizes which can be cut from 9 x 11-in. sheet; and rolls in 50-yd lengths.

This paper can be used in dry sanding operations. A nonloading coating prevents loading or clogging of the abrasive grain.—**Armour Coated Abrasives Div., Armour & Co.**, Alliance, Ohio.

For More Details Circle No. 444—Page 165

ACHESON

dispersions digest

Reporting uses for

dag® BRAND DISPERSIONS

COLLOIDAL GRAPHITE, MOLY-SULFIDE, VERMICULITE, AND OTHER SOLIDS

## 'DAG' DISPERSIONS – THE ANSWER TO LOWER COSTS, BETTER CASTINGS

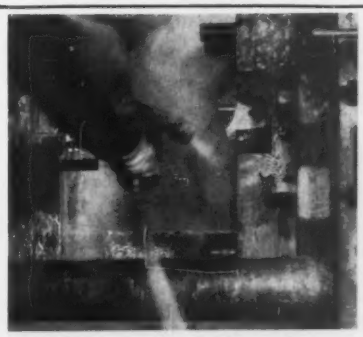
**Acheson dispersions have proved themselves to be particularly effective as die and mold cavity coatings. They contain heat-resistant solid particles so finely divided that they remain in suspension for extended periods, making continuous agitation unnecessary. This fineness is an important characteristic because the films formed with these dispersions are so thin that they do not affect casting dimensions. As described in the following application case histories, both colloidal and semi-colloidal dispersions provide excellent parting, high-quality surface finishes, and longer die life. The consistent uniformity of 'dag' dispersions is your assurance of uniform castings.**

A 'dag' 193 wash sprayed on mold cavities at Rapidscast Corporation gives them aluminum permanent mold castings of more uniformly high quality.

***"We're sold on 'dag' 193 because it's consistent",*** states Robert Cope, president of Rapidscast Corporation, Grand Rapids, Michigan. After trying 22 mold wash combinations with as many different characteristics, Mr. Cope settled on 'dag' 193 — an Acheson vermiculite dispersion with a water carrier. Why? . . . Because of its completely uniform consistency, 'dag' 193 can be easily mixed to the three dilution ratios Rapidscast uses to obtain the required variance in film thickness throughout their molds. The unbroken film provided by this dispersion acts as a heat-holding blanket which helps to prevent "shrinks" or vacuum holes caused by uneven cooling of the molten metal. Also important to Rapidscast is the durability of a 'dag' 193 film coating. One application generally lasts through an entire molding day of three shifts, except for occasional touch up at wear points. And this uninterrupted production is a "must" since Rapidscast supplies such demanding customers as the automotive, aircraft, hydraulic, marine and appliance industries.

You'll find that Acheson processing methods produce dispersions of finer quality and more versatile use. Call your Acheson Service Engineer today for more specific information on the use of 'dag' dispersions. Or write direct for additional facts on " 'dag' colloidal dispersions for use in metal casting." Bulletin No. 425. Address Dept. F-128.

'Aquadag' finds ready acceptance by diecasters for its high temperature resistance, clean parting, and a smoother-surfaced casting.



***Bendix finds 'Aquadag' a substantial cost saver.*** Rejects are down 30% at Bendix Foundries, Teterboro, New Jersey. Where surface folds, internal gas-induced porosity, and other not uncommon factors had previously caused a costly number of rejects in certain critical die-castings, Bendix now enjoys production advantages by using the Acheson water-based dispersion, 'Aquadag'. Used in casting magnesium jet-engine turbine blades and aluminum instrument components, the tough, dry lubricating film provides cleaner parting from the die. This film facilitates proper metal flow. It prevents the molten metal at 1250° F. from soldering to the steel die. It effectively resists the scrubbing action accompanying metal injection, where pressures are often as high as 30,000 psi. Proof of the inherent strength of this film is shown by the fact that one sprayed application normally lasts ten or more casting cycles. Die life is also appreciably extended. 'dag' Colloidal Graphite can play an important part in *your* casting operations . . . a lubricant that is non-volatile, chemically inert, and finely dispersed to provide complete coverage of the die surface.

**ACHESON** *Colloids Company*

**PORT HURON, MICHIGAN**

*A division of Acheson Industries, Inc.*

Also Acheson Industries (Europe) Ltd. and affiliates, London, England

50TH ANNIVERSARY

**Offices in:** Boston • Chicago • Cleveland • Dayton • Detroit • Los Angeles • Milwaukee New York • Philadelphia • Pittsburgh • Rochester • St. Louis • Toronto

# Literature for Foundrymen

## Welding Supplies

Form ADC 848C covers fluxes and ferrous and nonferrous rods for gas welding, and accessory items including protective clothing, goggles, electrode holders, sparklighters, cable, hose, weld cleaning tools, cylinder trucks, and other items for arc and gas welding.—**Air Reduction Sales Co.**, a division of **Air Reduction Co.**, 150 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 401—Page 165

## Replacement Brushes

Form 1196 charts size and part number for replacement brushes used in motors of electric fork trucks.—**Ohio Carbon Co.**, Dept. 222, 12508 Berea Rd., Cleveland 11, Ohio.

For More Details Circle No. 402—Page 165

## Vibrating Equipment

Foundry applications of vibrating equipment in Bulletin 5 include conveyors, feeders, shakeout and screening conveyors, sand lump breakers, tight flask shakeout conveyor, and other conveying equipment.—**Carrier Conveyor Corp.**, 211 N. Jackson St., Louisville, Ky.

For More Details Circle No. 403—Page 165

## Bridge Cranes

Bulletin DH-455-B presents technical data, specifications, and operating features of B-36 underslung single-bridge, hand-operated cranes in capacities of 1 to 10 tons and spans of up to 50 ft.—**Wright Hoist Div., American Chain & Cable Co.**, York, Pa.

For More Details Circle No. 404—Page 165

## Plastic Metal

Application Bulletin 3 presents case histories describing advantages obtained by use of the company's plastic metal products for repair purposes.—**Devcon Corp.**, Danvers, Mass.

For More Details Circle No. 405—Page 165

## Valves

Catalog Digest CD-2 lists company's complete line of industrial valves. Valve figure numbers are indexed for finger-tip reference by topics; face to face dimensions are supplied in full size ranges. A cross reference to the most commonly used figure numbers of ten valve manufacturers is included.—**Ohio Injector Co.**, Wadsworth, Ohio.

For More Details Circle No. 406—Page 165

## Utility Vehicle

Bulletin on the Model S-10 Moto-Bug shows how the unit can be converted from fork lift to drum handler, platform carrier, utility scrap-

er, and 10 or 15 cu ft capacity hopper carrier. Safety features of the machine also are covered.—**Kwik-Mix Co.**, Port Washington, Wis.

For More Details Circle No. 407—Page 165

## Table Blast Pads

Information sheet No. 111 describes the custom-built Resist-Abrade table pads for all types of table blast machines.—**A.I.C. Engineering Co.**, P. O. Box 55421, Uptown Sta., Indianapolis, Ind.

For More Details Circle No. 408—Page 165

## Discharge Gates

Bulletin V-3558 covers Type G rotary gates for dust collection, pneumatic conveying, and feeding applications. Selection factors and dimensional and capacity information are presented.—**Ducon Co.**, 147 E. Second St., Mineola, N. Y.

For More Details Circle No. 409—Page 165

## Cutting Torches

Form 1174 on flame-cutting equipment describes torches useable with every fuel gas combination and covers manual and machine cutting equipment for cutting sheet metal to risers 10 ft thick.—**Linde Co.**, a division of **Union Carbide Corp.**, 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 410—Page 165

## Axial Flow Fans

Recommended stack sizes, maximum horsepower, and maximum motor speed for variable stack velocity and air flow output are charted in Catalog 1110-B covering Series 300 Tubeaxial fans.—**Westinghouse Electric Corp., Sturtevant Div.**, Hyde Park, Boston 36, Mass.

For More Details Circle No. 411—Page 165

## Laminating Epoxy Resin

Physical properties of a new laminating epoxy resin and proper laminating procedures are described in Bulletin RPD900. A 52-in.-long, three-part corebox is included among the application illustrations.—**Rezolin Inc.**, 1651 18th St., Santa Monica, Calif.

For More Details Circle No. 412—Page 165

## Casting Repair Plugs

Descriptive literature gives sizes and prices on several styles of casting repair plugs available in steel, brass, aluminum, cast iron, malleable, stainless, magnesium, and alloys.—**Pipe Plugs Inc.**, Wellington, Ohio.

For More Details Circle No. 413—Page 165

## Hydraulic Crane

Two bulletins describe a mobile hydraulic crane; AD-2422 covers basic specifications and available attachments; AD-2407 covers working ranges and capacities.—**Austin-Western Construction Equipment Div., Baldwin-Lima-Hamilton Corp.**, Aurora, Ill.

For More Details Circle No. 414—Page 165

## Industrial Equipment

Bulletin G-3B discusses applications and performance characteristics of pumps, pneumatic conveyors, fluidizing conveyors, rotory compressors and vacuum pumps, hori-

**FOR MORE INFORMATION on Equipment, Supplies, and Literature described in this issue, mail one of these cards.**

●

**USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES AND LITERATURE DESCRIBED IN THIS ISSUE**

**FOUNDRY**
DECEMBER 1958

| | | | | | |
|---|---|---|---|---|---|
| 401 | 421 | 441 | 461 | 481 | 501 |
| 402 | 422 | 442 | 462 | 482 | 502 |
| 403 | 423 | 443 | 463 | 483 | 503 |
| 404 | 424 | 444 | 464 | 484 | 504 |
| 405 | 425 | 445 | 465 | 485 | 505 |
| 406 | 426 | 446 | 466 | 486 | 506 |
| 407 | 427 | 447 | 467 | 487 | 507 |
| 408 | 428 | 448 | 468 | 488 | 508 |
| 409 | 429 | 449 | 469 | 489 | 509 |
| 410 | 430 | 450 | 470 | 490 | 510 |
| 411 | 431 | 451 | 471 | 491 | 511 |
| 412 | 432 | 452 | 472 | 492 | 512 |
| 413 | 433 | 453 | 473 | 493 | 513 |
| 414 | 434 | 454 | 474 | 494 | 514 |
| 415 | 435 | 455 | 475 | 495 | 515 |
| 416 | 436 | 456 | 476 | 496 | 516 |
| 417 | 437 | 457 | 477 | 497 | 517 |
| 418 | 438 | 458 | 478 | 498 | 518 |
| 419 | 439 | 459 | 479 | 499 | 519 |
| 420 | 440 | 460 | 480 | 500 | 520 |

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

This card good in U. S. and Canada only—Expires Feb. 15, 1959

**USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES AND LITERATURE DESCRIBED IN THIS ISSUE**

**FOUNDRY**
DECEMBER 1958

| | | | | | |
|---|---|---|---|---|---|
| 401 | 421 | 441 | 461 | 481 | 501 |
| 402 | 422 | 442 | 462 | 482 | 502 |
| 403 | 423 | 443 | 463 | 483 | 503 |
| 404 | 424 | 444 | 464 | 484 | 504 |
| 405 | 425 | 445 | 465 | 485 | 505 |
| 406 | 426 | 446 | 466 | 486 | 506 |
| 407 | 427 | 447 | 467 | 487 | 507 |
| 408 | 428 | 448 | 468 | 488 | 508 |
| 409 | 429 | 449 | 469 | 489 | 509 |
| 410 | 430 | 450 | 470 | 490 | 510 |
| 411 | 431 | 451 | 471 | 491 | 511 |
| 412 | 432 | 452 | 472 | 492 | 512 |
| 413 | 433 | 453 | 473 | 493 | 513 |
| 414 | 434 | 454 | 474 | 494 | 514 |
| 415 | 435 | 455 | 475 | 495 | 515 |
| 416 | 436 | 456 | 476 | 496 | 516 |
| 417 | 437 | 457 | 477 | 497 | 517 |
| 418 | 438 | 458 | 478 | 498 | 518 |
| 419 | 439 | 459 | 479 | 499 | 519 |
| 420 | 440 | 460 | 480 | 500 | 520 |

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

This card good in U. S. and Canada only—Expires Feb. 15, 1959

**USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES AND LITERATURE DESCRIBED IN THIS ISSUE**

**FOUNDRY**
DECEMBER 1958

| | | | | | |
|---|---|---|---|---|---|
| 401 | 421 | 441 | 461 | 481 | 501 |
| 402 | 422 | 442 | 462 | 482 | 502 |
| 403 | 423 | 443 | 463 | 483 | 503 |
| 404 | 424 | 444 | 464 | 484 | 504 |
| 405 | 425 | 445 | 465 | 485 | 505 |
| 406 | 426 | 446 | 466 | 486 | 506 |
| 407 | 427 | 447 | 467 | 487 | 507 |
| 408 | 428 | 448 | 468 | 488 | 508 |
| 409 | 429 | 449 | 469 | 489 | 509 |
| 410 | 430 | 450 | 470 | 490 | 510 |
| 411 | 431 | 451 | 471 | 491 | 511 |
| 412 | 432 | 452 | 472 | 492 | 512 |
| 413 | 433 | 453 | 473 | 493 | 513 |
| 414 | 434 | 454 | 474 | 494 | 514 |
| 415 | 435 | 455 | 475 | 495 | 515 |
| 416 | 436 | 456 | 476 | 496 | 516 |
| 417 | 437 | 457 | 477 | 497 | 517 |
| 418 | 438 | 458 | 478 | 498 | 518 |
| 419 | 439 | 459 | 479 | 499 | 519 |
| 420 | 440 | 460 | 480 | 500 | 520 |

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

This card good in U. S. and Canada only—Expires Feb. 15, 1959

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

**BUSINESS REPLY CARD**
No Postage Stamp Necessary if Mailed in the United States

—POSTAGE WILL BE PAID BY—

**FOUNDRY**
Penton Building
Cleveland 13, Ohio

*Reader's Service Dept.*

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

**BUSINESS REPLY CARD**
No Postage Stamp Necessary if Mailed in the United States

—POSTAGE WILL BE PAID BY—

**FOUNDRY**
Penton Building
Cleveland 13, Ohio

*Reader's Service Dept.*

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

**BUSINESS REPLY CARD**
No Postage Stamp Necessary if Mailed in the United States

—POSTAGE WILL BE PAID BY—

**FOUNDRY**
Penton Building
Cleveland 13, Ohio

*Reader's Service Dept.*

**FOR MORE INFORMATION on Equipment, Supplies, and Literature described in this issue, mail one of these cards.**

●

zontal grate coolers, suspension preheaters, induced draft fans and hot gas washers, positive pressure blowers, and gas pumps.—**Fuller Co.**, Catasauqua, Pa.

For More Details Circle No. 415—Page 165

### Electric Truck

Dimensional and design data including basic construction features, turning diagrams, and like information on Model F-45T4, 4000-lb capacity electric-powered industrial truck are given in bulletin.—**Elwell-Parker Electric Co.**, 4205 St. Clair Ave., Cleveland 3, Ohio.

For More Details Circle No. 416—Page 165

### Pattern Letters

Catalog Supplement 1 for use with Pattern and Tablet Letter Catalog 957 shows new lower case Futura letters and lists new sizes of letters put into production since issuance of the original catalog last year.—**Canton Products**, Box 981, Canton 1, Ohio.

For More Details Circle No. 417—Page 165

### Industrial Fans

Construction features, applications, fan arrangements, and selection information on the company's complete line of industrial fans are presented in Bulletin I-585.—**Day Sales Co.**, 810 Third Ave. N.E., Minneapolis 1, Minn.

For More Details Circle No. 418—Page 165

### Tractor Shovel

A four-wheel drive, rear-wheel power-steer tractor shovel is featured in Bulletin CTS-111. Interchangeable buckets from 1¼ to 2¾ cu yd capacity also are shown. —**J. I. Case Co.**, Racine, Wis.

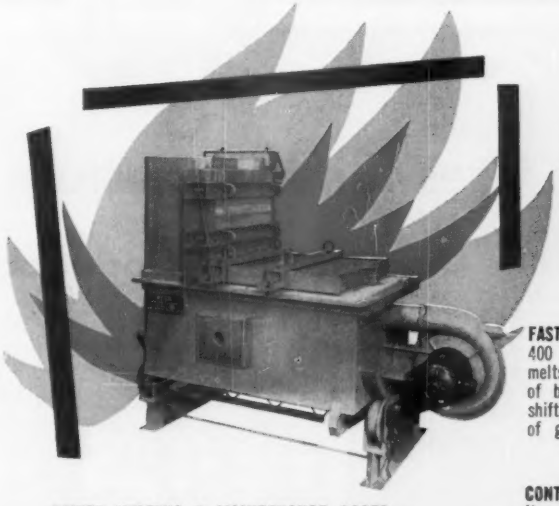
For More Details Circle No. 419—Page 165

THE NEXT GUY THAT DONT REPORT TO FIRST AID FOR A MINOR ACCIDENT WILL REPORT TO THE HOSPITAL FOR A MAJOR ONE!!
Jim Boyle Supt.
FOUNDRY
BARLEY

**"I'm sick of preaching safety practices to them"**


## SAVE $ WITH REDA FURNACES

FUEL SAVINGS UP TO 50% REPORTED USING REDA GAS-OIL FIRED FURNACES!



BEST HEAT EFFICIENCY

**FASTER MELTING** — One 400 series Reda Furnace melts up to 11,000 lbs. of brass or bronze per shift, and up to 6,000 lbs. of gray iron per shift.

**LOWER MELTING & MAINTENANCE COSTS**— One man can operate a Reda Furnace . . . No daily repairs needed!

**CONTINUOUS POURING**— No waiting until floors, flasks, boards, etc. are filled with molds!

**FURNACE DIVISION** WRITE TODAY FOR DESCRIPTIVE BULLETIN

**REDA PUMP COMPANY - BARTLESVILLE, OKLAHOMA**

Circle 646 on Page 51

## Arcair Torch SAVES $6000 for Lift Truck Maker

Confronted with a design change on 20 cast iron lift truck counterweights worth $300 each, the Automatic Transportation Co. of Chicago turned to Arcair for low-cost metal removal.

An earlier attempt to clean out an area 4"x 3"x 30" by means of drilling and oxy-acetylene cutting took a total of 24 hours and resulted in expensive drill bit breakage. At that point, it was decided to try the Arcair process . . . The result? — A Model H-3 Torch did the complete job in just 6 hours per casting at a cost of only $11.92 for the 100 "Copperclad" electrodes consumed.

Arcair can help you too! Basic simplicity — electric arc plus ordinary compressed air — makes the patented Arcair torch, with Arcair "Copperclad" Electrodes, the new, efficient, cost-cutting answer to most metal removing problems.

*Get more information from Arcair today!*

465 S. Mt. Pleasant St., Lancaster, Ohio

Arcair® Metal Removal Torches

Circle 647 on Page 51

# Uses for Magnesium Castings

## Discussed at Association Meeting

By EDWIN BREMER
*Metallurgical Editor*

FOURTEENTH annual convention of the Magnesium Association, held at the Pick-Fort Shelby Hotel, Detroit, Oct. 16-17, was attended by about 450 members and guests.

At a luncheon held Friday, Dr. C. J. Smithells, Magnesium Elektron Ltd., London, England, said that, as in this country, there has been an appreciable decrease in use of magnesium in Great Britain due primarily to the reduction in that country's defense plans. The industry is carrying on an active campaign to educate prospective users on the advantages of magnesium. Dr. Smithells indicated that the greatest deterrent to increasing use of magnesium is its high cost, and a 20 per cent reduction in cost would remove that obstacle. He stated that in Great Britain work is being actively pursued with a ferrosilicon reduction process for production of magnesium which shows bright prospects of being able to cut magnesium's cost to the area mentioned.

During the two-day meeting some 15 papers were presented on applications of magnesium. The following papers related to castings:

**Can Magnesium Meet the Challenge of the Automotive Wheel Market?** by John A. Main, Kelsey-Hayes Corp., Detroit—Magnesium is a satisfactory material for wheels, and where weight saving is desired magnesium can do a remarkable job. Before magnesium can meet the challenge of the automotive wheel market, however, lower costs of both material and processing, coupled with better performance or styling advantages, will have to be realized if it is to become acceptable as a commercial wheel material.

**Vibration Damping Capacity of Magnesium Alloys,** by D. F. Walsh, J. W. Jensen, and J. A. Rowland, Bureau of Mines, Department of the Interior, Rolla, Mo.—Magnesium alloys of low alloy content in the stress range of 500 to 3500 psi exhibit damping properties higher than those of cast iron. However, magnesium alloys of considerable alloy content have damping capacities considerably lower. Addition elements occurring as a separate phase or in solid solution reduce damping capacity, and the extent varies with the particular element and correlates with the strengthening effect of the addition.

**The Where and Why of Magnesium in Automotive Applications,** by E. L. Schaper, and H. A. Schertel, Dow Chemical Co., Midland, Mich.—Due to unfavorable price relationship, present automobiles use fewer magnesium parts than they did a few years ago. From an engineering point of view, automobiles could use considerable magnesium to advantage. Already about 58 lb have been used successfully in production items, 22 lb meet serviceability requirements, but have not been placed in production, and 271 lb of application are being investigated or warrant investigation. This total of 351 lb of magnesium would replace 708 lb of heavier materials, resulting in a weight saving of 357 lb.

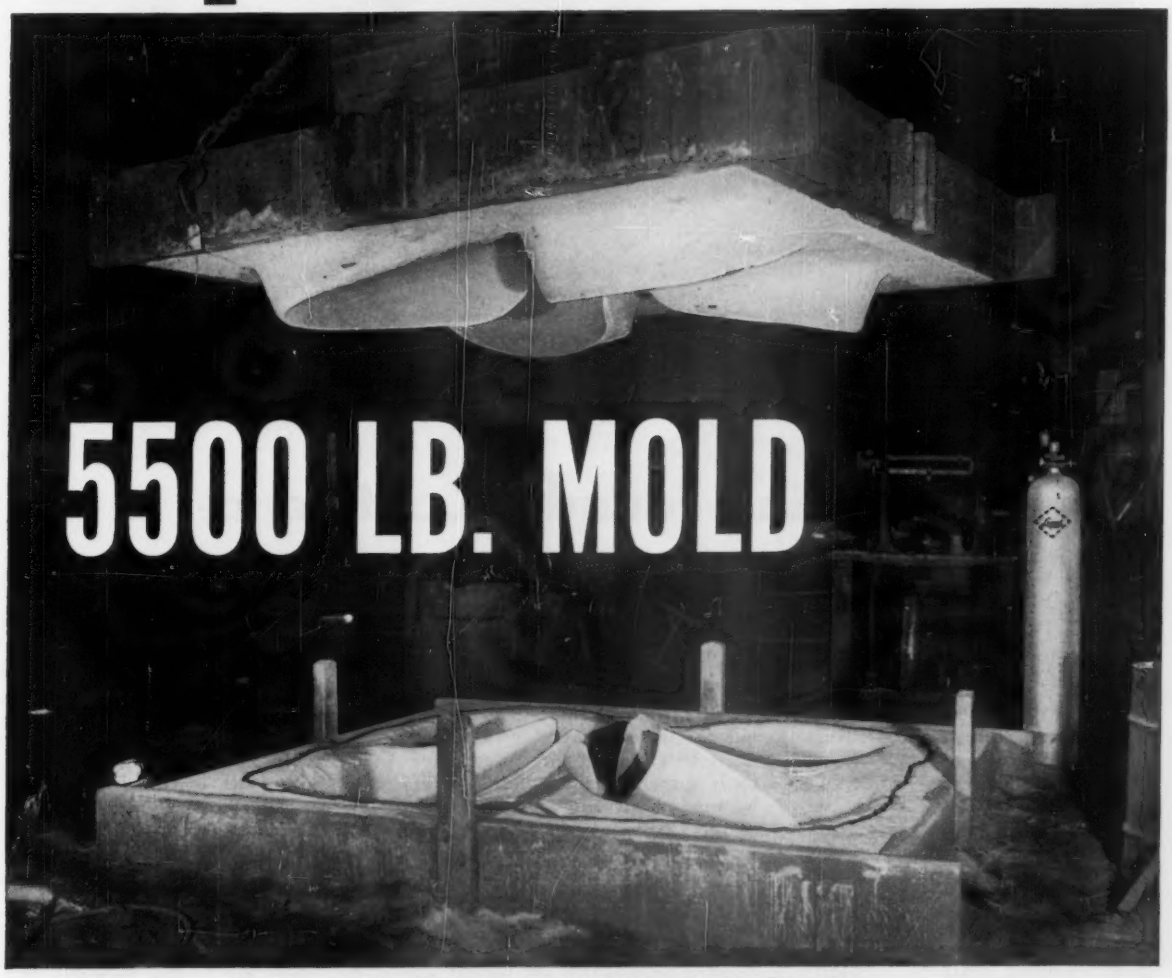
**Design Reproducibility of a Magnesium Casting,** by Walter Krzymowski and Carroll Miller, Martin Co., Baltimore—The objective of design reproducibility is to produce a design which satisfies performance requirements at the lowest possible cost, and consists of four major steps of a critical review of design criteria, analysis of possible designs, evaluation of their costs, and recommendations as to best design. The authors discussed a specific application to a particular design which resulted in the choice of a magnesium alloy casting in preference to another material and method of fabrication. Problem was to provide a rigid light-weight support frame for flight controls and radio sets for use in a modern jet bomber.

**Magnesium Applications in Airborne Fans,** by John Westell, Pesco Products Div., Borg-Warner Corp., Cleveland—Describes application of magnesium castings as rotors and housings in axial-flow fans used in aircraft. Wall thickness of the castings are about $\frac{1}{8}$ in. with trailing edges 1/16 in. thick.

**Why Allison Is Using Magnesium,** by C. F. Brandenburg, Allison Div., General Motors Corp., Indianapolis—Discusses use of magnesium casting in jet engines for such parts as accessory drive casings, rotor cages, front and rear compressor support assemblies and front and rear truss ring assemblies on the "cool" side of the engines. High strength-to-weight ratio of magnesium has permitted design for light-weight functional engine parts; good machining characteristics have produced low-cost engine parts; high damping capacity has permitted use of light-weight castings for longer life aircraft engine parts, and thorium and rare earth casting alloys with elevated temperature properties, especially creep strength, have made possible long life jet engine parts operating in the 300-500° F temperature range.

**Use of Magnesium Castings in Military Photographic Equipment,** by Miles J. Mraz and Carvyn Ellman, Chicago Aerial Industries Inc., Melrose Park, Ill.—Describes numerous magnesium casting applications in cameras, viewfinders, guided missile programming equipment, camera control units, stabilized mounts, etc.

# $CO_2$ CURES




# IN 40 MINUTES!

Fast, bakeless hardening of molds for large castings—like this one for 3400 pound nickel aluminum bronze propellers—is standard procedure at Columbian Bronze Corporation, Brooklyn, New York.

In addition to tremendous savings in time, Columbian Bronze reports these added advantages from $CO_2$ curing. no baking required • far fewer gaggers needed • elimination of need for extreme skill necessary in green sand molding • no danger of drops, soft spots or wet spots in mold • molds may be left for several days before pouring.

**For complete facts and technical data on how $CO_2$ mold curing will revolutionize your operation, contact**

*World's Largest Producer of*

LIQUID CARBONIC

DIVISION OF GENERAL DYNAMICS CORPORATION

Dept. 932 • 135 South LaSalle St. • Chicago 3, Ill.



Circle 648 on Page 51

An extensive plant visitation program was a feature of the conference. This group is looking over facilities at Dominion Foundries & Steel Ltd.

# Canadian Foundry Conference

## *Features Forward-Looking Theme*

By **ROBERT H. HERRMANN**
*Associate Editor*

OVER 250 foundry industry men met in Hamilton, Ont., Oct. 16-17, for the seventh All Canadian Foundry Conference. Topics discussed under the conference theme, "Make It Better with Castings," included light vs ferrous metals, industrial education, quality control, pouring and gating sand castings, science for foundries, and molding sand control.

An extensive plant visitation program included visits to Canadian Westinghouse Co., International Harvester Co. of Canada, Dominion Foundries & Steel Ltd., McCoy Foundry Co., and Galt Brass Co.

**Light Metals vs Ferrous Metals**—by H. E. Gravlin, Chrysler Corp., Detroit. A gradual shift of cast parts from ferrous to light metals is inevitable and will make great strides in the next 5 years. In the automotive industry where economy of vehicle operation is becoming an important selling point, reduced car weight is becoming a must. Great weight, once believed necessary for a comfortable ride, no longer is needed because of new suspension systems.

Several automotive parts already have been converted to aluminum; engine blocks and other engine components will be next. Chrysler is working on several prototype aluminum engines. Automakers also want to eliminate the large driveshaft tunnel in the middle of cars because of growing customer complaints. Because past experience with front-drive autos has not been too promising, the trend probably will be to rear-engine, rear-drive cars. The engine for such a car will have to be light in weight to achieve satisfactory car-weight distribution for proper driving characteristics.

In addition to the automotive industry, the agricultural and appliance industries probably will use more aluminum castings. Many of these conversions will be at the expense of ferrous castings. Iron and steel foundries must begin now to meet this competition by tightening specification and improving production practices to achieve better quality and by reducing weight of individual castings through good functional design.

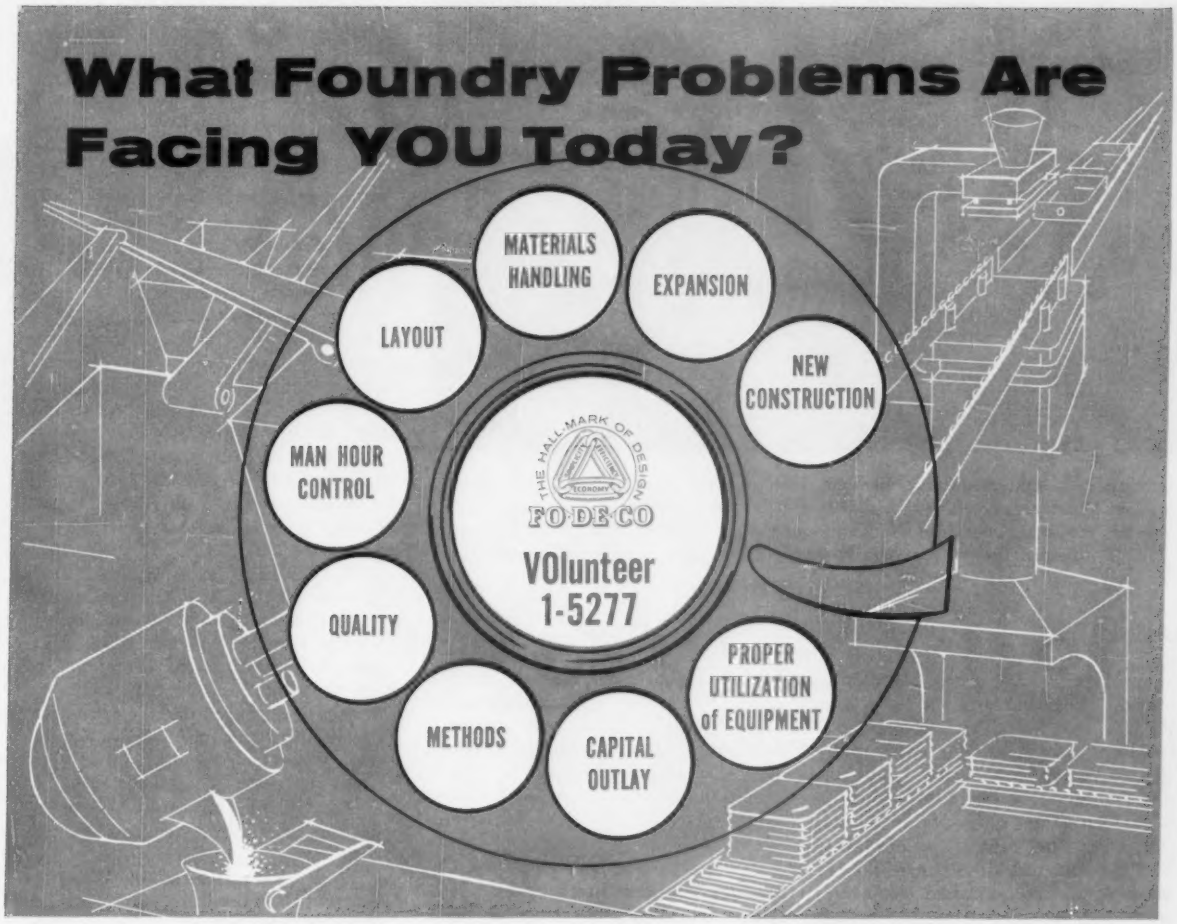
**The Third Revolution**—by S. H. Deeks, Industrial Foundation on Education, Toronto. Most current education is aimed at satisfying future demands, not today's demands. That is necessary for the development of scientific and technical knowledge and offers satisfactory educational opportunity for above-average students capable of university training. It does not, however, meet the need of upper-average level students capable of postsecondary school education at the technical institute level.

With today's fast rate of technical development, technicians trained in a specialized, narrow field existing between the skilled worker and professional levels of education are needed to apply our rapidly expanding knowledge. Training for that type of work should be in a self-contained terminal course if it is to cater to average ability.

The need exists to determine requirements in the various fields, to set up national standards of training, and to organize technical institutes for offering such training.

**Is Quality Control Old Stuff in the Foundry?**—by W. K. Bock, National Malleable & Steel Castings Co., Cleveland. Quality control means knowing how to make a casting that meets your customer's requirements and making it that way consistently.

In the ordinary foundry process certain variables exist in human endeavor, machines get out of adjustment, and raw materials vary, but usually within a certain range. The




## THEIR *Answers* ARE AS CLOSE AS YOUR TELEPHONE!

By contacting FODECO (Foundry Design Co.), you may bring into your plant immediately a foundry engineering service developed by experienced personnel who can offer design ingenuity for special purposes adaptable to your operations.

At all times the objective is to achieve maximum efficiency and coordination in melting—molding—coremaking—cleaning. With such coordination, foundry deficiencies are remedied and production increased. Complete foundry production layouts utilizing existing equipment or guiding alterations, expansion or selection of new equipment are fundamental functions of our service.

Let us arrange for you to visit any of the companies who have availed themselves of our service.

**FOUNDRIES SERVICED BY FODECO**

| | |
|---|---|
| AMERICAN FOUNDRY & MFG. CO. | St. Louis, Mo. |
| J. I. CASE CO. | Racine, Wisc. |
| J. I. CASE CO. | Rockford, Ill. |
| ELECTRIC STEEL FOUNDRY CO. | Portland, Oregon |
| ELYRIA FOUNDRY DIVISION OF CHROMALLOY CORP. | Elyria, Ohio |
| LUDLOW VALVE MANUFACTURING CO., INC. | Troy, N. Y. |
| MACK TRUCKS, INC. | (Steel Foundry), New Brunswick, N. J. |
| OTIS ELEVATOR CO. | Yonkers, N. Y. |
| A. P. SMITH MANUFACTURING CO. | East Orange, N. J. |
| TOWER GROVE FOUNDRY | St. Louis, Mo. |
| VIKING PUMP CO. | Cedar Falls, Iowa |
| WORTHINGTON CORPORATION | Harrison, N. J. |
| WORTHINGTON CORPORATION | Buffalo, N. Y. |
| WORTHINGTON CORPORATION | Oil City, Pa. |

THE HALLMARK OF DESIGN FODECO®

# FOUNDRY DESIGN CO.

*Affiliate:* SORBO-MAT PROCESS ENGINEERS

**106 South Hanley Road · St. Louis 5, Missouri · Telephone: VOlunteer 1-5277**



*Circle 649 on Page 51*

Enjoying a conversational moment, left to right, are J. A. Wotherspoon, J. A. Wotherspoon & Son Ltd.; J. M. Hughes, Stevenson & Kellogg Ltd.; J. W. Wallace, Canadian Westinghouse Co.; T. E. Langs and M. N. Tallman, A. H. Tallman Bronze Co.; V. H. Furlong, Foundry Services (Canada) Ltd.

process is in control. Charts show this. They show that a process is out of control when a point falls outside allowable limits. They also show a trend within limits that is heading toward outside limits. In this instance preventive measures can be taken to bring the process back to normal.

During the discussion period it was pointed out that charts should be kept for all specified properties such as tensile strength, brinell hardness, and dimensions as well as on other elements which might affect quality.

**Pouring and Gating of Green Sand and Shell Castings**—by J. F. Orloff, Central Foundry Div., General Motors Corp., Saginaw, Mich. Gating systems, particularly the surface and volume ratio of casting to risers, should be engineered properly to produce a sound casting. The ideal complete gating system sometimes must be compromised with production requirements such as placing runners so that they may be removed by automatic equipment.

Production of consistent quality castings also depends on such standardized production techniques as putting the same amount of sand in flasks, using the same number of jolts, striking off a mold in the same way each time, and, in the case of malleable iron, pouring at a height below 8 in. In line with obtaining consistent mold density, the company has been experimenting with rubber diaphragm molding machines. Results to date indicate that casting tolerances and finishes are comparable to those obtained in shell molds.

Central Foundry Div. recently has gone into extensive use of shell cores in green and resin-bonded sand molds. So far no chemical contamination has been experienced in the green molding sand. Occasional additions of a No. 55 sand compensate for the fine sands used in shell cores.

**Science at the Service of the Canadian Foundry Industry**—by S. L. Gertsman, Dept. of Mines & Technical Surveys, Physical Metallurgy Div., Ottawa, Ont. Research work of the department covers the whole broad field of foundry metallurgy. Typical of the problems studied and for which solutions were found are those of metal penetration in steel castings, scabbing and other difficulties with gray iron castings, and desulfurization of iron and steel.

In the nonferrous field degassing procedures were studied and various physical properties were determined for several magnesium casting alloys. Pressure tightness and hot tearing characteristics of nickel bronzes were investigated and test bar designs studied.

**Molding Sand Control**—by A. G. Johnston, American-Standard Products (Canada) Ltd., Toronto. A definite relationship exists between the several physical properties of molding sand. If one property is out of control, the sand may still be in control by being balanced by another property. All physical tests should be correlated with each other before any change is made in the molding sand mixture. Moisture and clay content, flowability, density, and screen analyses were discussed and the influence of variation in each on other properties explained.

W. H. Bleakley, Abco Inc., Erie, Pa., was the principal dinner speaker the first night of the conference. In his speech, *What a Blind Man Sees*, he described the life of a person who has lost his sight and emphasized management's responsibility for instituting and enforcing proper safety procedures and attitudes to prevent loss of eyesight. L. H. Durdin, national AFS president, voiced the greetings of the society.

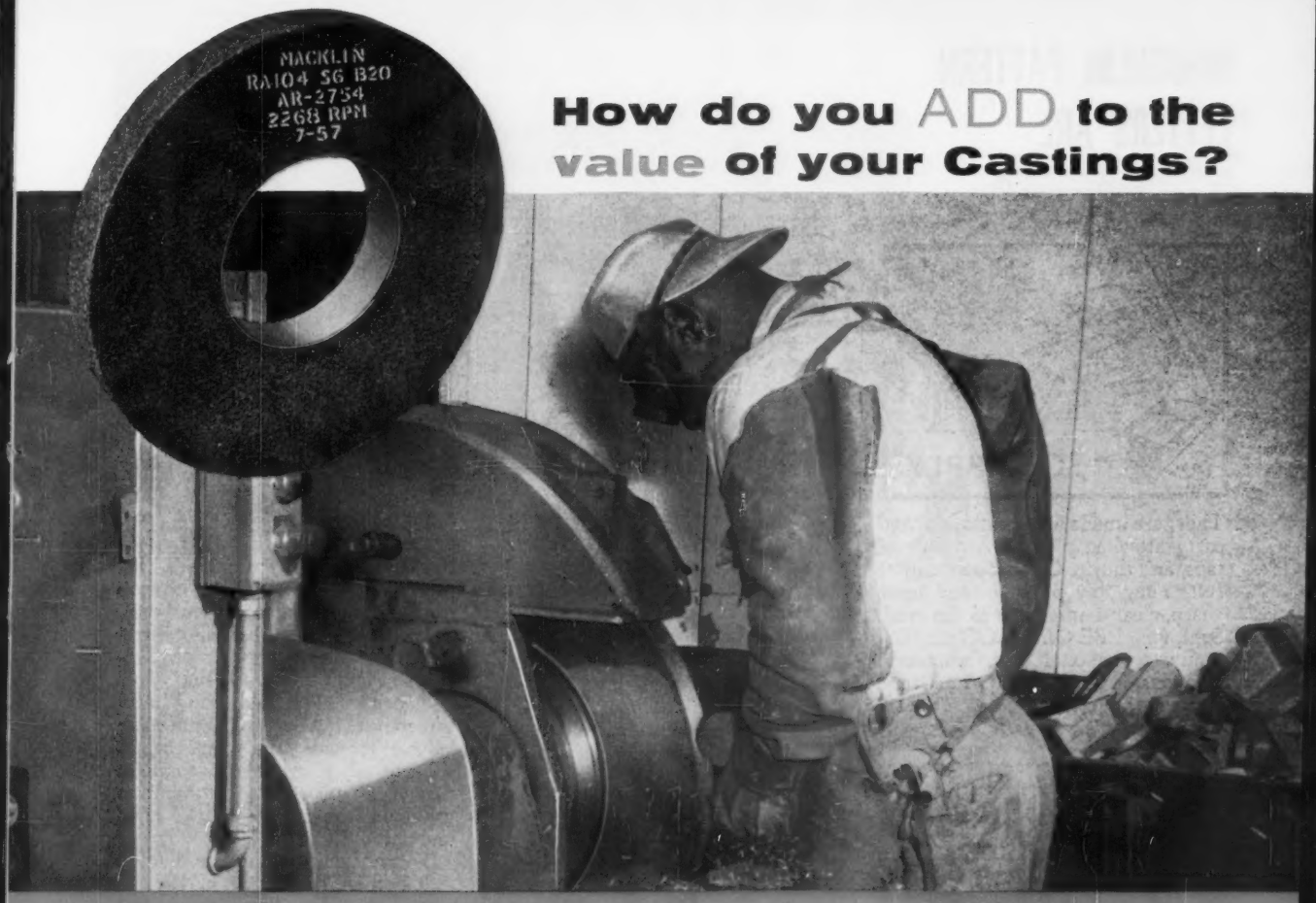
J. W. Kerr, Canadian Westinghouse Co., Hamilton, Ont., at the banquet concluding the conference described some of his impressions of Russia, illustrating his talk with slides taken during a recent trip to that country.

## Albion Malleable Iron Co. Licenses French Foundry

Albion Malleable Iron Co., Albion, Mich., has contracted with Fonderie des Ardennes, Pont-Audemer, Eure, France, for the production in the French Union of Spher-A-steel, a new type of ferrous alloy developed by Albion.

Fonderie des Ardennes, producer of malleable iron products for French automobile industries, operates foundries at Meezieres and Pont-Audemer, the latter being one of the most highly-mechanized operations in Europe.

The Industrial Development Division of International Basic Economy Corp., New York, is associated with Albion Malleable in the development of foreign licensing and technical assistance agreements. This is the first foreign licensing for production of Spher-A-steel.




# How do you ADD to the value of your Castings?

## There's a MACKLIN *"wheel of Profit"* ..... that will do the Job!

**WHETHER YOU SNAG CAST IRON, MALLEABLE IRON, OR NON-FERROUS CASTINGS,** you snag more metal per dollar, keep your finished casting costs down, when you put Macklin snagging wheels to work in your cleaning room. Yes . . . grinding wheels do add value to your castings, and MACKLIN wheels add *more* at *less cost* to you.

On floor stands, portables, and swing frames, Macklin foundry wheels give cool, fast cutting. Long wheel life. They require less dressing, and hold corners better. And, Macklin's modern production techniques give users the closest possible wheel duplication, order after order.

**LEADING FOUNDRIES REPORT...**

Alloy nickel *"wheel cuts fast, finish is good."*

Steel Castings *"time per casting cut almost 4 minutes."*

Pearlitic iron *"cutting action very good. Long life."*

Cast iron *"wheel outlasted competitive wheel by 12 hours."*

*YOUR MACKLIN DISTRIBUTOR WILL GLADLY ARRANGE AN ON-THE-JOB TEST, or write direct.*

GRINDING WHEELS

**MACKLIN company** • **Dept. 22** • **JACKSON, MICHIGAN**

*Circle 650 on Page 51*

## MAUGHLIN PATTERN LETTERS ARE

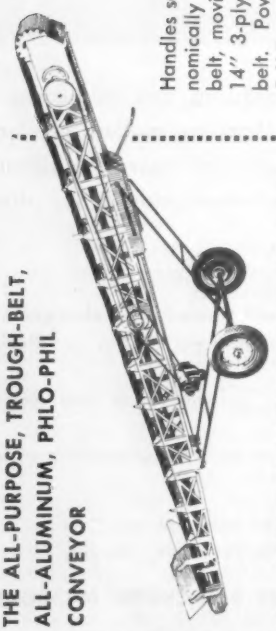
They are made of aluminum, and carry attached points. A couple of taps, and they're ON because they're IN! They stay put, too, and leave sharp, clean impressions in the sand. Send for FREE CATALOG showing many types of letters, numerals, fractions, in stock for quick delivery. Trademarks and monograms made to your specifications.

**THE H. P. MAUGHLIN CO.**

953 Ingleside Ave., Columbus 8, O.

*Circle 651 on Page 51*

Handles sand quickly and economically over its 20° troughed belt, moving on 3 rollers with 14" 3-ply, 28-ounce, oil-proof belt. Powered with 3.6 or 5 H.P. gas engines, or up to 3 H.P. electric motor. One man can roll it anywhere—and watch it doing 20 men's work!



THE ALL-PURPOSE, TROUGH-BELT, ALL-ALUMINUM, PHLO-PHIL CONVEYOR

*Takes the drudgery out of work for men in foundries all over.*

PHILLIPS CONVEYOR COMPANY
Memphis, Missouri

*Circle 652 on Page 51*


# Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

## "Molding Secrets"

THERE may be hotter places than Sacramento, Calif., in mid-July, but to a visitor from the San Francisco Bay area (a heavenly all-year climate), Sacramento is hot enough.

I was just such a visitor on one of our capital city's sultriest days. In the hope of cooling off a bit, I visited Berry's Foundry and found Bob Berry in the midst of pouring off.

I didn't ask how business was. Such a question would have been impertinent and superfluous. In fact, Bob didn't give me a chance to ask anything. Instead, he greeted me with his best professional sneer.

"I've been reading that stuff of yours," he said (this surprised me, for I didn't know he could read), "and I didn't think much of your latest column. You expressed regret that Benvenuto Cellini wrote only an autobiography and left no record of his molding methods. I've got news for you: Cellini wrote a good-sized book, his *Treatises,* describing in minute detail all of his so-called molding secrets. And what's more, I have a copy of that book!"

I was momentarily floored, even flabbergasted, but after regaining a measure of composure, I quiveringly inquired, "You have this book, now, at home?"

"I have!"

"May I borrow it?"

"You may not!"

"Oh, come now, Bob. Are you forgetting the fellow who gets you out of sand trouble and practically saves your life?"

"There's no use begging. This book doesn't leave my house. I'll let you look at it if you promise not to touch, but that's all. For all I know, there may not be another copy of this book in the world. As a matter of fact, only 600 copies of this translation were printed, and that was 60 years ago in London. Most of them probably have been destroyed by fire, children, or something else. This book is priceless, and I'm going to keep it that way!"

I cajoled, pleaded, and even threatened, but he was obdurate. I believe it was finally at the insistance of a troubled conscience that he invited me to "drop in at the house" on my way out of town, and I did.

To my complete surprise, I found that Bob is a bibliophile of the first water. His den, living room, bedrooms, and other rooms were stacked high with rare books—first editions, last editions, and single editions, bound in every material that the imaginative brain of an artistic bookbinder could dream up.

There were books running the gamut from an early printing of William Shakespeare to a copy of *Little Bo Peep,* the latter inscribed by the author. One book was bound in and printed on delicate vellum, and is purported to be the only copy ever produced.

If I were to attempt to describe what I saw in Bob Berry's tremendous collection, I would be accused of gross exaggeration. Let me say only that this Sacramento foundryman has a treasury of books that should turn other booklovers green with envy.

Cellini's *Treatises* he let me look at and finally, with reluctance, let me touch. That was as far as I supposedly was permitted to get.

It was still quite warm then, even though the sun was about to quit for the day in Sacramento. I suddenly had a brilliant idea! "Bob," I said, "I'm thirsty. Do you have an extra can of beer in the refrigerator?" He had, and he started

View of Gray Iron Pallet System. Pallets can be easily moved over rails by hand. Left: Plant Engineer Robert H. Clarke. Right: Scale mounted on fork truck weighs each component of charge.

# ENGINEERING APPLICATIONS PAY OFF AT DALTON FOUNDRIES

**INCREASED EFFICIENCY**

To obtain faster, more efficient, production in the company's gray iron foundry, Robert H. Clarke, Plant Engineer at Dalton Foundries, Inc., Warsaw, Indiana, designed a pallet system. This flexible system allows molders to work two hours before pouring needs to begin. Cooling time can be varied to suit the job and pallets can be easily moved over rails by hand. No bottom boards are used and the handling formerly required to bring them back to the molders has been eliminated. The pallet system provides flexibility for both production and jobbing type work.

**BETTER CONTROL**

When bond and water are added to sand during mulling, the bond must be thoroughly combined with water to be effective. Plant Engineer Clarke designed a system to pre-mix water and bond, and pump the mixture into a storage tank where it is stirred continually. From the storage tank, small amounts of the mixture are metered into a tank by a timer. Compressed air then blows this metered amount into the muller at the correct time. This system has resulted in better control of sand, faster mulling cycles, and easier handling of materials.

**LOWER COST**

At the Dalton Foundries the old wheelbarrow method used to charge the cupola required seven men. Clarke designed a scale which could be mounted on the front of a fork truck to weigh each component of the charge as it was loaded into a drop-bottom tub on the truck. After it is loaded, the fork truck delivers the material to the charging bucket. This simple, and inexpensive engineering change reduced the labor requirements to three men instead of the seven previously required.

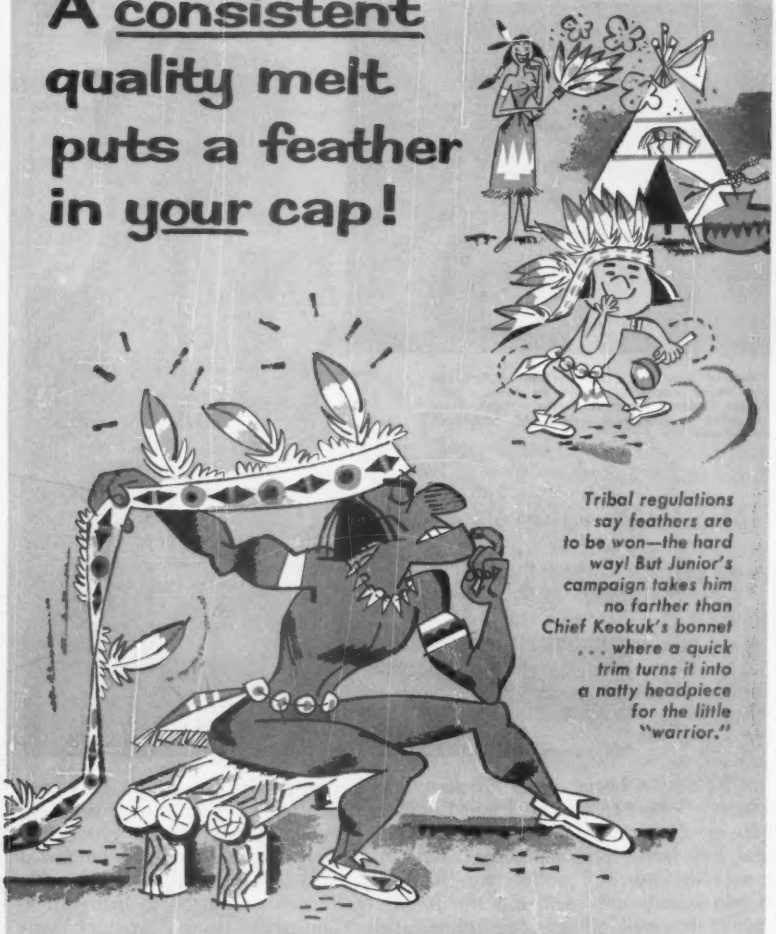
**You can help create a source of engineering talent for the foundry industry by participating in the FEF program as a contributing member.**

## Foundry Educational Foundation

1138 TERMINAL TOWER BUILDING • CLEVELAND 13, OHIO

The Foundry Educational Foundation does not pay for this advertising. This advertisement has been prepared and the space contributed by FOUNDRY magazine in support of FEF's constructive program for foundry industry progress through education.

# A consistent quality melt puts a feather in your cap!



*Tribal regulations say feathers are to be won—the hard way! But Junior's campaign takes him no farther than Chief Keokuk's bonnet . . . where a quick trim turns it into a natty headpiece for the little "warrior."*

**HERE'S A SURE WAY TO STEP UP MELT QUALITY—AND KEEP IT THERE**

Choose economical Keokuk Silvery . . . the superior form of silicon introduction. Pig for pig . . . car for car, its uniformity never varies—result, a consistently high quality melt. Handle by magnet, charge by weight, or count the pigs for equal accuracy. Available in regular analysis or alloyed to exact specifications. Aluminum makers, put a feather in your cap . . . use Keokuk Silicon Metal!

*Keokuk Electro-Metals Company, Keokuk, Iowa;*
*Wenatchee, Division, Wenatchee, Washington*

**KEOKUK** **SILVERY PIG IRON**
SILICON METAL—OTHER FERROALLOYS

When you think of SILICON, think of KEOKUK!

SALES AGENT: MILLER AND COMPANY
332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Keokuk Silvery Pig—the superior form of silicon introduction—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.


out to get it, foolishly laying the book on the table beside me.

You probably think that I grasped the book as soon as he had left the room, eager to scan those beautifully printed pages. Well, you're absolutely right! Not only that, but I was tempted sorely to dash out with it before he could return. Prompted by lessons in honesty acquired at my mother's knee, however, and the disturbing thought that I couldn't possibly get away with it, I decided to resort to other measures.

After we had consumed a mellowing amount of beer, I decided to try flattery. I was sure that he couldn't resist. With tears in my eyes (a trick I learned in dramatic school), I implored him to consider the facts unselfishly. Cellini's *Treatises* never were intended to be hoarded in a secluded library, I told him. It belonged to the foundrymen of the world, as the author intended in his dedication:

> To the metal workers of the guild of handicraft, for whom I have set my hand to this work, and to whom I look for the fruit it is to bear.

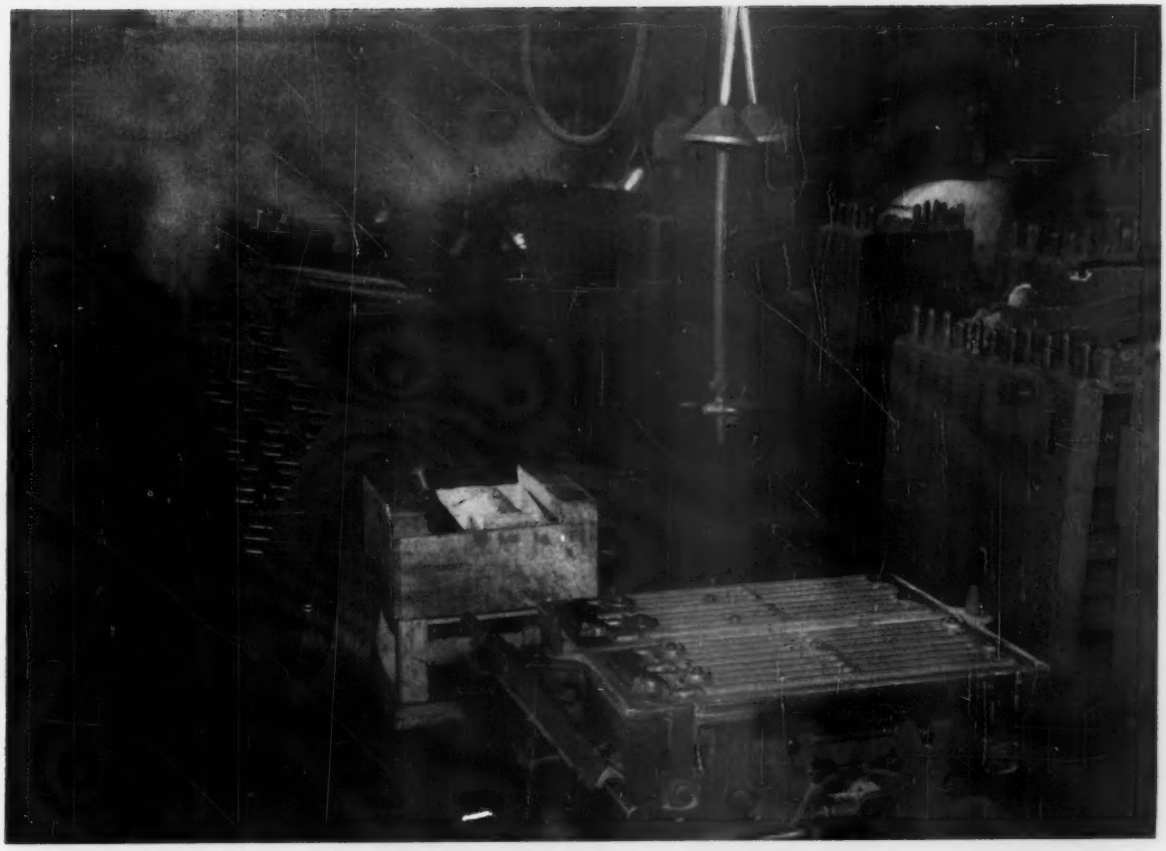
Bob grinned. "Okay, you win," he said. "Take it home and make your notes—but don't forget who it belongs to."

In just two weeks, plus the destruction of one brand-new typewriter ribbon, the little lady who darns my socks transcribed those treasured pages with a fidelity that may earn her a new carpet for the living room. Two typed copies of this manuscript are ready for use; one is in the fireproof files of FOUNDRY (I hope), and the other beside me as I scribble this.

I trust that my genial editors will permit me to use portions of it in one or more of my future columns. I feel that there are foundrymen who still want to read about the ancient materials and methods which produced the most beautiful statuary the world has ever seen. Much of it is still on display at Cellini's birthplace, Florence, Italy.

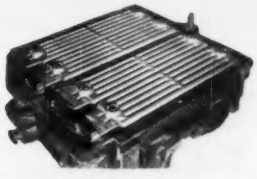
Like the rest of us, Cellini inherited much of his practice, and he pays due tribute to those who instructed him in the art of making statues, medallions, and special coins. He openly recognized the great masters of his day, but went on to explain some of the shortcomings of his contemporaries and how he had to invent and devise to accomplish his ends.

He speaks of using shredded cloth and horse manure to facilitate



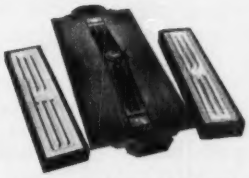
• HEATING RADIATOR PATTERN

# 75% SAVINGS AT WEIL McLAIN FOUNDRY



• RADIATOR PATTERN

• GAS BOILER PATTERN



• GAS BURNER REVERSE PATTERNS

THE heating radiator pattern shown in top photo at the Weil - McLain Foundry at Erie, Pa., was made from HYSOL TC2204 Plastic Tooling compounds instead of the usual cast iron. Cost for the iron pattern would be $175.00. But the cost for a HYSOL pattern made from a reverse is *only $20.00!*

Of added importance, Weil-McLain officials expect 125,000 castings per pattern or a minimum of 4 years daily production. At the end of this time, the pattern can be repaired in a matter of hours or discarded and another made.

The radiator pattern at left top was also made from HYSOL TC2204. This unit has actually undergone 66,000 runs with only 2 thousandths of an inch wear. A reliable basis for planning many more years of use from the same pattern.

At left center, Mr. Stan Trezenski, Secretary of the American Foundrymen's Society of Erie and assistant foundry superintendent at Weil-McLain, shows HYSOL gas boiler pattern. On this unit alone, $800.00 was cut from older methods of pattern-making. This pattern has already been used two years and 20 additional years of daily production is expected.

The end sections, lower left, are gas burner reverse patterns and the center section is a working pattern again having an estimated four years of use. All are made with HYSOL Plastic Tooling with proven utility and cost benefits.

**Down to earth facts from foundrymen that HYSOL Plastic Tooling saves money! This is typical of how HYSOL is helping others and can help you maintain high standards of production with substantial reductions in your costs. Free booklets and technical assistance are available on request.**

HYSOL — PROGRESSIVE PRODUCTS THROUGH CHEMICAL RESEARCH

A product of

**HOUGHTON LABORATORIES INC.**

OLEAN, NEW YORK

•

HYSOL of California, Div. South El Monte, California

•

HYSOL (CANADA) LDT.
TORONTO, ONTARIO

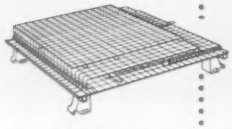


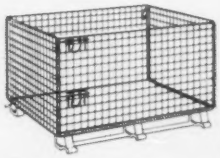
Circle 655 on Page 51

*what's your..*

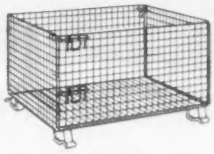
CARRYING CHARGE?

*6,000 pound unit loads are efficiently and economically handled in USP Palletainers—and, empty Palletainers can be "flat-folded" for space savings and lower return rates.*

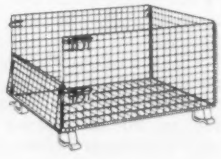




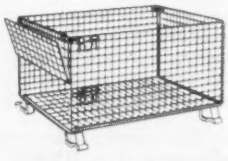
Bearing Plate



Hi-Lode



Warehouse



Bulk-Lode

What's it costing you to handle materials to and from production or assembly lines, in and out of storage, truck loading and transporting? There is an *easy way* . . . a practical, economical way with versatile USP Palletainers.

Palletainers have simplified materials handling for thousands of plants in scores of industries. And, these practically indestructible containers can save you valuable time and money both in and out of your plant. Whether you're processing, storing or distance-hauling, Palletainers provide the practical answer. Available in four basic types and a broad range of practical standardized sizes. They're engineered for safer handling, ceiling high stacking, faster 8-way entry for fork truck plus the advantages of content visibility for speedy inventory.

***For Full Information on Palletainers...***
*including names and locations of users, or for obligation-free consultation on Palletainer application in your plant—write, wire or call Union Steel, today!*

USP PALLETAINERS®

*manufactured only by:*

**UNION STEEL PRODUCTS CO.**

520 N. BERRIEN ST. ALBION, MICHIGAN


shakeout. He especially warns his readers, "You must let the clay, cloth frayings, and horse manure decompose for about four months or more, the longer the better, for then the cloth-frayings rot, and owing to this the clay gets to be like an unguent." Today, we accomplish the same result with slightly more dignity and considerably less odor.

We need not become unduly excited over all ancient relics in a misguided spirit of reverence, but the exercise of a high intelligence deserves respect and admiration in any age. Benvenuto Cellini certainly has earned the plaudits of a grateful world as a rugged individualist in artful endeavor. More of this anon.

## Exchange Lecture Features British Steel Conference

At the annual conference of the British Steel Castings Research Association, held Oct. 23 in Harrogate, England, Charles W. Briggs, technical and research director of the Steel Founders' Society of America, Cleveland, presented a paper entitled "The Deoxidation and Degassing of Cast Steel." Mr. Briggs' paper followed the theme of the conference, "Steel Making and the Properties of Steel Castings."

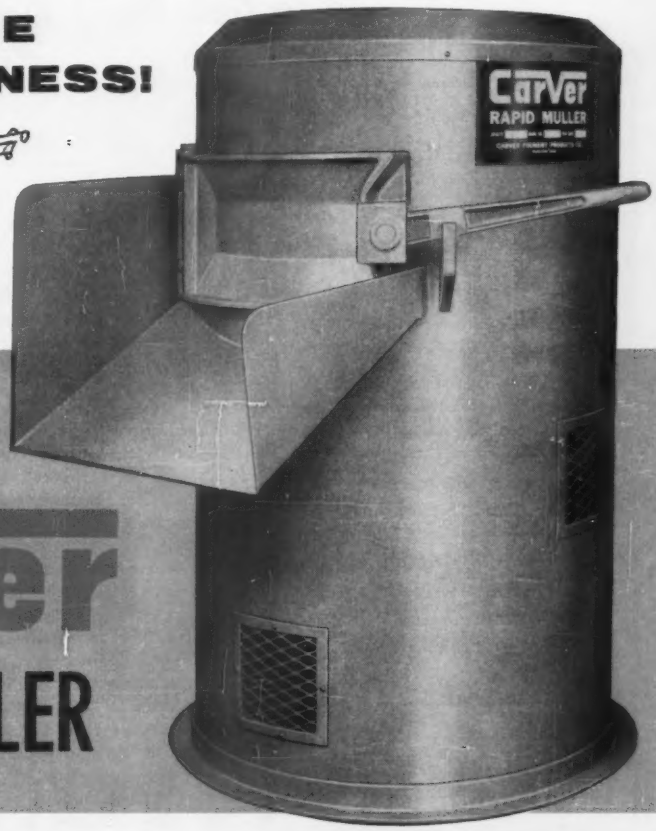
This is the second of a series of exchange lectures between British Steel Castings Research Association and Steel Founders' Society of America.

## Book Review

*Bronze-und Eisenguss* (Bronze and Iron Castings) by Hans Schmidt and Herbert Dickmann, linen, 122 pages, 7¾ x 10⅛ in., published by Verein Deutscher Giessereifachleute, and available from Giesserei-Verlag G.m.b.H., Breite Str. 27, Duesseldorf, Germany. Price 20 D.M.

Originating in the special historical exhibit held in connection with the 1956 International Foundry Technical Congress, this volume shows in text and numerous illustrations the advancement of foundry technique from prehistoric and early historic beginnings to the present time. It does not pretend to be a complete history but is designed to show today's foundrymen how in the past cast materials were melted and made into useful and beautiful forms, and also the capabilities of molders and melters in various periods.

# FASTEST DRAW IN THE BUSINESS!




## THE AMAZING NEW Carver RAPID MULLER

Don't let production become ambushed by slow, inefficient mulling . . . maintenance hog-tied by mixers that are hard-to-clean and service. Get the drop on competition . . . speed up core and mould sand mixing to *a draw every 75 seconds!*

**THAT'S RIGHT!** Carver Rapid Mullers give you a mix every 75 seconds yet do the job so thoroughly that you save up to 30% in binder. Each grain of sand receives an equal coating of binder, leaving the mix absolutely free from lumps or wet spots.

Extreme simplicity of design makes the Carver Rapid Muller virtually self-cleaning . . . its one rotating part eliminates costly wear and repairs.

This amazing, compact muller covers the ground it stands on (less than seven square feet), yet outdraws competitive mullers two batches to one, or better.

ARRANGE FOR A "SHOW-DOWN" RIGHT IN YOUR OWN FOUNDRY! Carver will square its Rapid Muller off against any other muller made and beat it to the draw *every time.*

***WRITE OR CALL TODAY FOR COMPLETE DETAILS***

**Only Carver Has Everything For the $CO_2$ Process!**

**CARVER** F & S Core Shooters

**CARVER** Automatic Gassing Apparatus

**KRAUSS** Core Vents

**STEINEX** available only from CARVER

**MAIL TODAY**

**CARVER FOUNDRY PRODUCTS CO.**
**Muscatine, Iowa**

PODNAH, I'm half-convinced! Rush information on the new Carver RAPID MULLER plus a FREE "Fast Draw" demonstration.

NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

# Preventing Lighting-Off Explosions

## *In Gas-Fired Furnaces*

By J. B. SMITH
*Chief Engineer*
Factory Mutual Engineering Div.
Associated Factory Mutual Fire Insurance Cos.

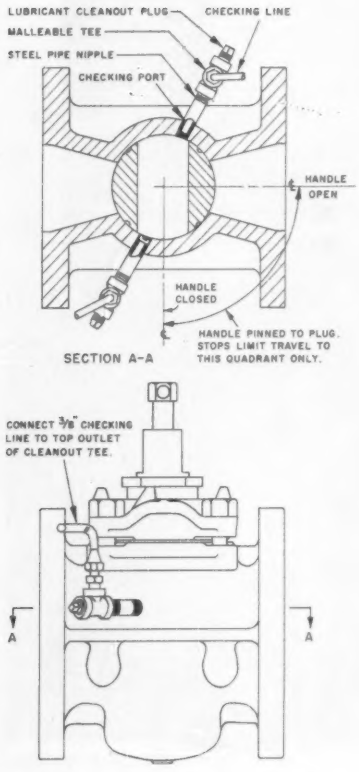



Fig. 1—Cock is constructed with a narrow key-way that permits gas to flow either to burners or through side outlets, but not through both

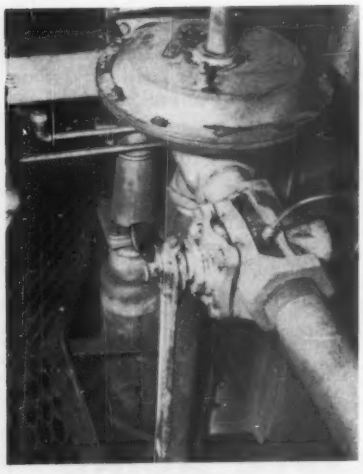


Fig. 2—Cock used on furnace control system. Gas flows through side ports to operate the switch

A RECENT study of 83 fuel explosions at heat-treat furnaces over a 10-year period showed that 40 occurred during lighting off. Of the 40, at least 25 resulted when one or more burner cocks accidentally were left open when the main gas valve was turned on.

All of these accidents were preventable. The problem is, of course, the human factor. Industrial boiler and furnace operation, depending as it does on human operators, never will be entirely foolproof.

This article will describe a gas safety control system developed by the Factory Mutual Engineering Div. Laboratories, Associated Factory Mutual Fire Insurance Cos. Currently in use in many plants, it provides a simple, efficient safeguard against a primary cause of such explosions—that is, premature admission of gas to open burner cocks.

**Safety Control System**—One type of FM cock system is designed around three important units: A special gas cock, a checking pressure switch, and an electric safety shutoff valve on the main gas line.

The cock is similar to normal gas cocks, but is equipped with two side outlets. These furnish a small, independent passageway which is open only after the main gas passage has closed completely. The cock is constructed (Fig. 1) with a narrow keyway that permits gas flow either to the burners or through the side outlets, but not both.

This construction feature is important. It is gas or compressed air, supplied through the side ports of the cock, which furnishes pressure to energize the valve on the main gas line. This energizing force cannot reach the switch unless all burner cocks are turned off because of interior cock construction. It therefore is impossible to open the main gas valve unless the burner cocks have been closed fully.

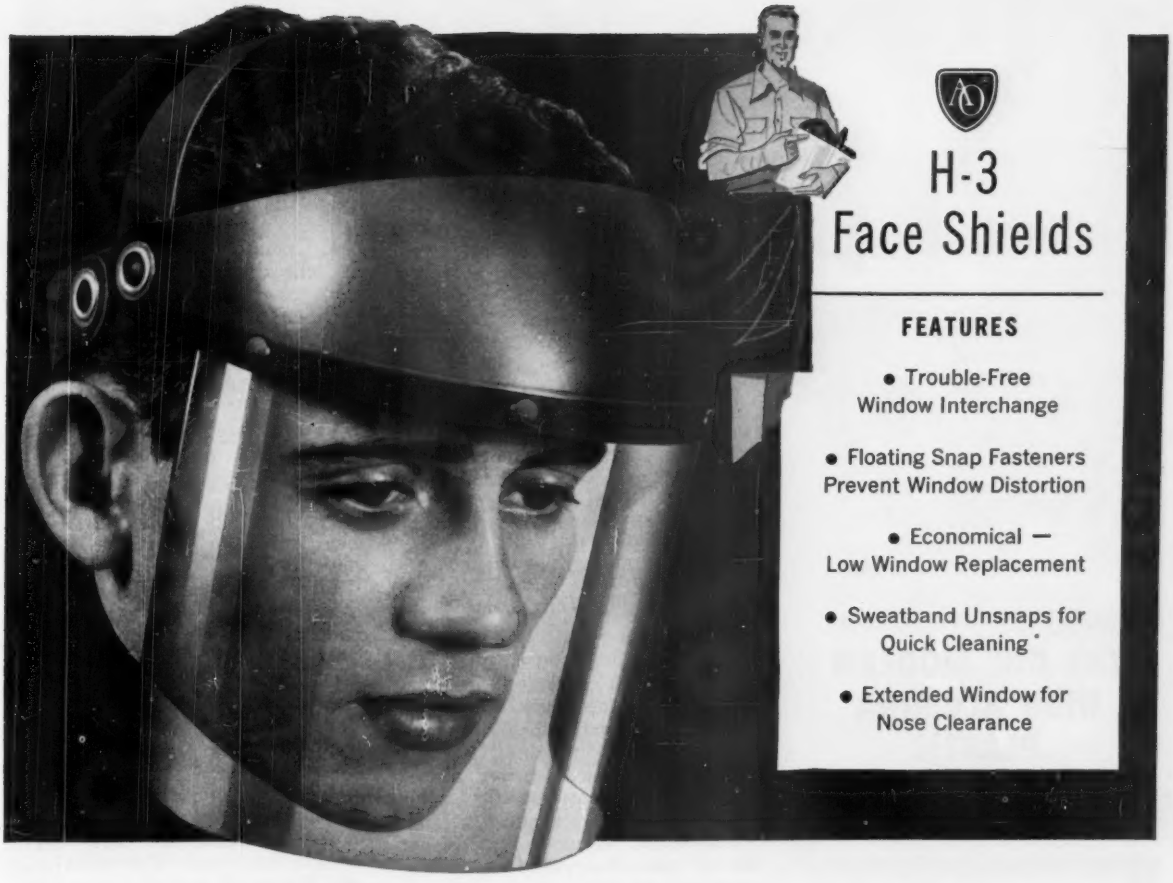
Cocks for this purpose are manufactured to particularly close specifications. In sizes up to 2 in., Factory Mutual approved cocks are manufactured by D. T. Williams Valve Co., Cincinnati, and W. J. Schoenberger Co., Cleveland. In sizes from 2½ to 6 in., the Nordstrom lubricated plug cock, manufactured by Rockwell Mfg. Co., Pittsburgh, is approved. All are equipped with integral handles and are suitable for manufactured, natural, propane, and butane gases. The integral handles, combined with quarter-turn (90-degree) operation, provide a visual check on cock position in addition to interior construction safeguards.

**Cocks Connected in Series**—The side ports of all cocks are connected in series with copper tubing. In a typical application where gas is used as the checking medium, one end of the line of tubing is connected to the main gas line on the upstream side of the main shutoff valve, the other to the checking pressure switch.

In lighting off, the operator first turns gas into the small tubing connecting the cock side ports. If the cocks are fully closed, as they should be, gas flows through all cocks by way of the side ports and operates the checking pressure switch. This action energizes the electric safety shutoff valve on the main gas line so that the operator can open it. He must do so manually.

As soon as the electric valve is opened, gas flows into the burner piping and operates a low-gas-pressure switch which shunts out the checking switch. This second switch keeps the electric valve from closing when the individual cocks are opened to light the burners. It also furnishes the usual protection in case of gas pressure failure, being set to trip the main safety shutoff valve in the event of dangerously low gas pressure.

A bleed orifice is required at the end of the line of tubing. It must be small enough to prevent gas from escaping into the room at dangerous rates and to allow pressure to build up and close the checking pressure switch promptly if there is a free passageway



# H-3 Face Shields

**FEATURES**

- Trouble-Free Window Interchange
- Floating Snap Fasteners Prevent Window Distortion
- Economical — Low Window Replacement
- Sweatband Unsnaps for Quick Cleaning
- Extended Window for Nose Clearance

## Look for these features when you buy Your next Face Shield — They mean economy

AO "H" Series Face Shields (H-3 shown) provide quality protection when sawing metal, working with chemicals, sanding, grinding, etc. Slotted window with patented floating snap fasteners assures easy window alignment and prevents window buckling in heat — low window replacement. Deeper spark deflector protects forehead. Real leather sweatband snaps in and out for quick and easy cleaning. Extended window clears nose and increases ventilation. Window can be thrown back. Automatic friction joints hold window firmly — no constant knob adjustment. Tension is steady even after constant use. Headband adjusts to any head size.

NOTE: Where heat is a factor, use an "H" Series Face Shield with aluminized window which reflects 80% of radiant heat.

*Your nearest American Optical Safety Products Representative can supply you.*

### CUT COSTS WITH AO HEAVY DUTY WORK GLOVES

*Comfort?* They're tailored to fit hands naturally, have no unnecessary seams. *Durability?* Customer tests of hundreds of dozens show they can take several dry cleanings with shrinkage held to an absolute minimum (and flexibility retained). Leather palm, canvas back. Flat seamed . . . reinforcing welt . . . wing thumb . . . continuous palm . . . heavyweight chrome tanned side split cowhide — and many other quality features.

### AO 750 LENS CLEANING STATION

Helps eye protection pay off! Supplies all necessary cleansing and anti-fog materials in a small, compact cabinet which provides for disposal. Made from selected hardwood. 12″ x 9″ x 6″. Attaches to wall at handy plant locations. Complete unit consists of: 6-oz. bottle and sprayer, two boxes of cleaning tissue, one 1 oz. jar of anti-fog paste. NEW AO Super-Clear Antifog Fluid can be used with this cabinet.

*Always insist on AO Trademarked Safety Products*

American Optical COMPANY
SAFETY PRODUCTS DIVISION

**SOUTHBRIDGE, MASSACHUSETTS**
*Safety Service Centers located in Principal Cities*

1833-1958 • 125 LEADERSHIP YEARS


Circle 658 on Page 51

NARCO 70 B

THE ONE MODERN HIGH ALUMINA PLASTIC REFRACTORY

for ALL your requirements!

- Electric Furnace Roofs or Center Sections
- Crucible Furnaces
- Runners
- Spouts
- Ladles (all types)

JOINTLESS CONSTRUCTION

EASE OF INSTALLATION

LONG-LASTING SERVICE

Furnished in

- 100 lb. Easy-to-Handle Cartons
- Conveniently Sized 2" Slices
- Air or Hand Ram Consistency
- Polyethylene Envelopes for Safe Storage

NORTH AMERICAN REFRACTORIES CO.
General Offices, Cleveland 14, Ohio

DISTRICT SALES OFFICES:
New York 7, N. Y.
Philadelphia 2, Pa.
Boston 10, Mass.
Buffalo 3, N. Y.
Pittsburgh 22, Pa.
Detroit 2, Mich.
Chicago 3, Ill.
Cincinnati 2, Ohio
St. Louis, Mo.
Los Angeles, Calif.

NARCO

NORTH AMERICAN REFRACTORIES, LTD.
Hamilton, Ontario

Circle 659 on Page 51

through the checking tubing, yet large enough to relieve pressure quickly and reopen the checking switch so as to transfer supervision to the low-gas-pressure switch.

**Combustion Air Blower Application**—In a combustion air blower system—the arrangement most frequently encountered in industrial plants — the checking pressure switch is operated by air pressure. A third pressure switch provides protection against failure of combustion air pressure as well as assurance that the combustion air blower will be started in proper sequence during lighting-off.

The low-gas-pressure switch should be located in the burner gas piping so that no valve can form a gastight barrier between it and the cocks. If such a valve is present, an additional pressure switch or a bypass around the valve may be required.

### Controlling Temperature

Where automatic temperature control is by high-low or modulating zone control valves in the gas piping, it is customary to provide a shutoff cock on each side of each control valve to permit its removal for repairs. A valved bypass also is provided around each control valve to permit burner operation. At such installations, either a permanent flame bypass is required around the valve in the bypass line or an additional pressure switch downstream of the zone control valve. Contacts of these low-gas-pressure switches should be wired in series.

Occasionally on new multiburner equipment, and more frequently on older furnaces and ovens, temperature is maintained automatically by zone control valves firing on-off with a continuous pilot at each burner. When such equipment is shut down, pressure trapped between the closed main safety shutoff valve and closed zone control valves would hold the low-gas-pressure switch closed, keeping the main safety shutoff valve energized so that it could be reopened even though all burner cocks were not closed.

This bypassing of the safety checking system can be prevented by arranging a small solenoid valve to open automatically and bleed pressure from the piping when the main safety shutoff valve is closed. The small solenoid valve is wired to special contacts in the main safety shutoff valve which hold the solenoid valve closed while the shutoff valve is open.

**System Testing**—The gas safety control system can be tested easily for proper operation while the oven is idle and the burner cocks are closed. The following procedure is suggested:

1. Observe that indicator on main safety shut-off valve reads "Shut."
2. Remove covers from pressure switches and note that all contacts are in the open position.
3. Close safety circuit switch.
4. Open cock and admit gas to the checking line. If air is used, start combustion air blower and open main blast gate.
5. Note that with all gas safety control cocks closed, checking pressure switch closes and light comes on.
6. Open and close any gas safety control cock and observe closing and opening of checking pressure switch.
7. Check for small flow from bleed orifice to make sure it is not obstructed.
8. Try to open the main gas safety shutoff valve manually. It should be possible to open this valve only if all gas safety control cocks are closed.
9. Note that contacts of the low-gas-pressure switch close as the main gas safety shutoff valve is opened.
10. At the completion of the above tests, all gas cocks should be closed, covers replaced, and safty circuit switch left open. The combustion air blower, if any, should be shut down.

If for production reasons the firing of burners cannot be interruped to shut the oven down for several minutes to make the foregoing tests, the checking pressure switch contacts at least should be inspected to see that they are open, and the bleed-orifice should be examined externally for obstructions.

The inspector should check the covers of safety control devices (safety shutoff valves, pressure switches, etc.) to be sure they are held in place securely by the screws provided. The presence of valves, etc., with covers removed, or loosely attached with only a screw or two, indicates the possibility of habitual tampering for the purpose of bypassing the safety control arrangement. Where means are furnished, covers of safety shutoff valves should be sealed in place with wire and lead seals. Condition of the seals should be checked regularly.

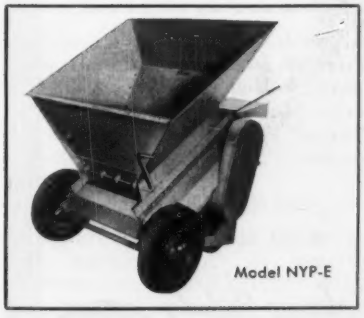
**Individual Burner Cocks**—Individual burner cocks should be provided where practical so that gas can be supplied to the furnace burners one at a time. If the valve arrangement is such that two or more burners must be lighted simultaneously, pilots are necessary.

## AERATE AND FLUFF AT MOLDING STATION FOR MAXIMUM BENEFITS

To take full advantage of the economies of central sand conditioning, highly mechanized foundries usually find it necessary to sacrifice other elements. Some of these are permeability, flowability and cooled sand.

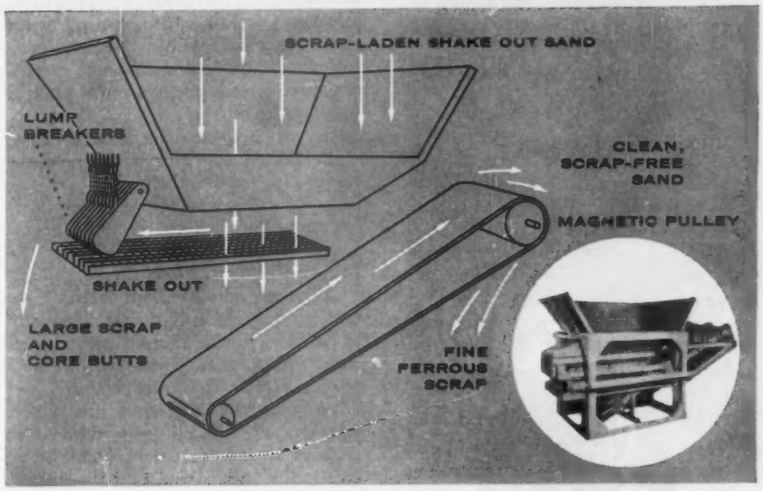
To produce the best possible molds, sand should be aerated and fluffed as the final operation before it is used. More and more, foundries with central systems are turning to Royer to help improve their sand's properties.

Thousands of foundries have increased the permeability of their molding sand 10 to 20 points by aerating at the molding station with a Royer Separator and Blender, like the Model NYP-E shown here. Besides eliminating the problems of packed sand, they gain the advantages of better flowability and cooled sand. Royerizing reduces new sand requirements and often eliminates entirely the need for facing sand. Castings have smoother finishes, too, reducing grinding and cleaning costs.


Model NYP-E

Royer Sand Separators and Blenders are available in sizes to fit any foundry need. This Model NYP-E handles the charge of a front-end loader. Other models are available with capacities as low as seven tons per hour.

Two bulletins describe the Royer line of Sand Separators and Blenders. Bulletin SS-54 covers machines from 7 to 60 tons per hour maximum capacities. Bulletin NY-54 describes the series engineered for high capacity sand handling systems. Write for your copy today.




# Sand Contamination Drains Your Profits

Periodic business recessions in the foundry industry point up the need to eliminate waste and excessive hand labor—or sacrifice profits. In one area of foundry operation—sand contamination — important strides have been made in stopping the profit drainage.

Tramp iron damage usually occurs at the muller, conveyor belts, aerator or patterns. Patterns faced with contaminated sand produce poor casting finishes and high scrap loss. Probably the most efficient and economical way to remove contamination and produce clean sand is with a Royer Scrap Control Unit.

Referring to the drawing, shake out sand from the molding floor is dumped by front-end loader into the receiving hopper. Large scrap is riddled out by the Shake-Out and discharged at convenient wheelbarrow height for collection and removal.

Ferrous scrap small enough to pass through the grid openings of the Shake-Out is separated from the sand by a magnetic pulley at the upper end of the conveyor belt. Depending upon the degree of mechanization you employ, clean sand discharge may be made to a skip hoist feeding a muller, conveyor belt, or into the hopper of a Stationary Royer Separator and Blender for cooling, aeration and blending. We recommend discharge onto a heap for transporting by front-end loader to a Portable Royer Separator and Blender at the molding station for cooling, aerating and fluffing.

If tramp iron is the cause of any of your profit loss, we invite you to discuss your problem with the foundry-wise Royer agent serving your territory. He'll explain how a Royer Scrap Control Unit can pay for itself in less than two years, stop your profit drainage and improve the quality of your castings.

Your first step in stopping profit drainage caused by sand contamination is to mail the coupon for our latest Scrap Control Bulletin. We'll send it without obligation—plus the name of the agent who serves you.

**ROYER FOUNDRY & MACHINE CO.**

ROYER 159 PRINGLE STREET KINGSTON, PENNA.

Sand Contamination is cutting into our profits. Please rush me your Scrap Control Bulletin.

NAME_____

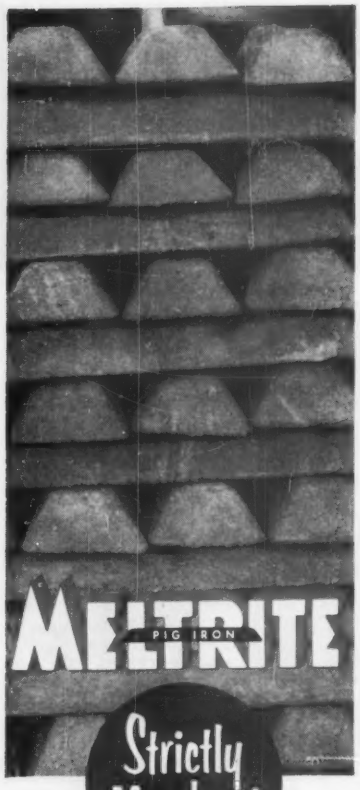
COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



Circle 660 on Page 51




Meltrite is strictly a merchant pig iron. The entire production is *for sale* at all times.

Always in dependable supply.

SERVICE DEPARTMENT AVAILABLE WITHOUT OBLIGATION

*Serving Industry Since 1883*

P M

**PICKANDS MATHER & CO.**
CLEVELAND 14, OHIO
Chicago • Cincinnati • Detroit • Duluth
Erie • Greensboro • St. Louis • Washington

IRON ORE • PIG IRON
COAL • COKE • FERROALLOYS

Circle 661 on Page 51

Where fixed pilots are installed, they should be supplied with premixed gas. Zero-governor-inspirator, high - pressure - atmospheric inspirator, and gas-mixing-machine type mixers are preferable to low-pressure-atmospheric inspirators. The pilot gas should be taken from the upstream side of the safety shutoff valve for the main burners.

A mandatory pre-ventilation purge period, manual or automatic as practical, should be provided. Where possible, the use of limit switches which would require opening doors and fresh-air inlet dampers during the purge period should be employed.

In all instances, a high-caliber, well trained operator is the primary factor in safe lighting-off. In the final analysis, whatever safeguards are provided, safety depends greatly on the fireman's following the proper lighting procedure.

A recent development is the electric cock, which consists basically of a conventional two-way lubricated plug cock equipped with a special supervisory switch assembly. This is so arranged that the switch contacts are closed only when the cock is closed. (In sizes from ¾ to 6 in., the only Factory Mutual approved electric cock is the Fireye FM Supervisory cock available from Combustion Control Div., Electronics Corp. of America, Cambridge, Mass.) It is similar in application to the pneumatic cock and may be used on oil as well as gas burners. The pneumatic cock is suitable for use on gas burners only.

## Book Review

***How To Supervise People,*** **fourth edition, edited by Alfred M. Cooper, 264 pages, 5½ x 8 in., published by McGraw-Hill Book Co., 330 West 42nd St., New York 36.**

In this edition the book has been brought in line with today's changing conditions, but the practical viewpoint and simple, direct treatment of earlier editions have been retained. New material has been incorporated to aid the supervisor, superintendent, and executive in situations created by automation, communication needs, and present-day stresses in human relations.

The material covers typical jobs and problems of hiring, discipline, accident prevention, teamwork promotion, training of workers, delegating authority, labor relations, etc. Techniques for handling them are discussed, with examples of typical problems and specific solutions now being used in general practice.

MILWAUKEE SOLVAY

Highest Quality Foundry Coke

SINCE 1904

MILWAUKEE COKE SOLVAY

Year after year MILWAUKEE SOLVAY COKE ranks as a superior foundry coke...made from *carefully selected* coal:

1. Low in ash
2. Low in sulphur
3. High in carbon
4. Highly resistant to shatter and abrasion

SERVICE DEPARTMENT AVAILABLE WITHOUT OBLIGATION

*Serving Industry Since 1883*

P M

**PICKANDS MATHER & CO.**
CLEVELAND 14, OHIO
Chicago • Cincinnati • Detroit • Duluth
Erie • Greensboro • St. Louis • Washington

IRON ORE • PIG IRON
COAL • COKE • FERROALLOYS

Circle 662 on Page 51

# Obituary

**VICTOR F. STINE**, president, Pangborn Corp., Hagerstown, Md., died Oct. 29. With the company over 45 years, he had served as auditor, assistant treasurer, assistant secretary, secretary, second vice president, vice president, and vice president in charge of sales and engineering. He became president

VICTOR F. STINE

in 1957. Mr. Stine was a past director of the Foundry Equipment Manufacturers Association and of the Chesapeake Chapter of the American Foundrymen's Society. For many years he served on the exhibits committees of FEMA and AFS.

**Robert D. Phelps Sr.**, president of the Francis & Nygren Foundry Co., Chicago, died Nov. 4. Mr. Phelps for many years was active in the Gray Iron Founders' Society, serving as vice president, treasurer, and director.

**Edward M. Klopfleisch**, 60, assistant superintendent of foundry maintenance, Allis-Chalmers Mfg. Co., Milwaukee, died Nov. 1.

**Carleton B. Tibbetts**, president and chairman of the board, Los Angeles Steel Casting Co., Los Angeles, died Oct. 28. Mr. Tibbetts had served as a director and on various committees of the Steel Founders' Society of America.

**Allan S. Bixby**, since 1955 manager of the Melrose Park, Ill., plant, National Malleable & Steel Castings Co., died Nov. 5. Mr. Bixby was graduated from Rose Polytechnic Institute and joined the company in 1921. He was transferred to the Chicago plant in 1926, where he became plant engineer and finishing superintendent. In 1939 he was named general superintendent at Melrose Park, and later assistant manager.

**Bruce W. Burroughs**, former foundry executive and industrialist, died Oct. 22, in Cleveland. Mr. Burroughs was executive vice president and general manager of the former National Bronze & Aluminum Foundry Co., Cleveland, and later was with the former Acme Aluminum Alloys Co., Dayton, Ohio.

**Leon E. Koleman**, 67, since 1941 factory superintendent, Fremont Flask Co., Fremont, Ohio, died Oct. 18.

**Robert W. Nelson**, 48, vice president, American Air Filter Co., Louisville, died Oct. 9. In 1939 he joined the Herman Nelson Corp., Moline, Ill., and was a vice president when it was acquired by American Air Filter in 1950. Mr. Nelson was executive assistant to the sales director until 1956, when he became the director of American Air Filter's central administrative staff.

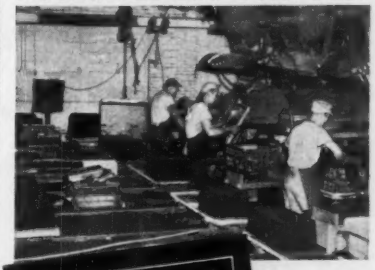
**Frank W. Wabiszewski**, 66, since 1945 executive vice president, Maynard Electric Steel Castings Co., Milwaukee, died Oct. 18. His father, Sylvester Wabiszewski, who is president and chairman of the board, bought the Maynard company in 1916. Frank Wabiszewski joined the firm as a purchasing and sales agent and later became secretary and general manager.

**David C. Griggs**, 87, former president and chairman, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., died Oct. 9.

**Barnett H. Fischer**, 55, president of City Pattern Foundry & Machine Co., Detroit, died in Chicago, Oct. 22. His residence was in Winnetka, Ill.

**Arthur E. Heimbach**, president of General Railway Signal Co., Rochester, N. Y., died Oct. 17.


MODERNIZE and COMPETE!



NOMAD EQUIPMENT pays off!

with
INCREASED PRODUCTION
and
PROFIT-MAKING EFFICIENCY

Produce more molds per day using NOMAD CONVEYORS. Each man hour is more productive because molds are no longer carried away by the molder. Instead, molds "roll away" on conveyors.

**NOMAD SAVES VALUABLE FLOOR SPACE** with Double Level Track. This "2 in 1" conveyor gives additional saving of manpower when equipped with a Mold Dump at the shakeout end and a Pallet Raiser at the molders' end.

The gravity type Mold Dump shown above is of simple design and sturdy construction. It features a fast dumping cycle and effortless operation. A wide variety of mold sizes can be handled.

IT'S LOW COST MODERNIZATION!

*Write for information.*

NOMAD EQUIPMENT

NOMAD EQUIPMENT DIVISION
WESTOVER CORPORATION
3110 W. FOND DU LAC AVE.
MILWAUKEE 10, WIS.

Circle 663 on Page 51

# Around the Country

NEWS REPORTS FROM

**Chicago . . . Pittsburgh . . . Cleveland . . . Philadelphia**

***Pittsburgh***— Increased pig iron production at Pittsburgh Coke & Chemical Co. reflects a slight improvement in local foundry operations. For the first time since March, the firm is using both of its blast furnaces. Business is spotty but sufficient to warrant the replacement of low inventories.

Foundries that supply the steel industry with rolls, ingot molds, and castings for maintenance report better sales. Those serving the automotive, plumbing, and agricultural equipment industries say their bookings are on the upgrade, too.

In general, the gains are far from spectacular. Says the sales manager of a steel foundry: "Things are a little better, thanks to a pick-up in mill orders for castings used in maintenance and repair work. Our November shipments will probably be about 10 per cent better than last month's, but it's unlikely that fourth quarter results will match those of the first three months. We're still operating at 50 per cent of capacity and living on a hand-to-mouth basis. We don't look for much improvement before the first quarter of 1959."

Gray iron foundries are getting more inquiries but precious little business. Many are operating three or four days a week, with backlogs varying from nothing to 10 days. Few believe that their fourth quarter shipments will be any better than those of the previous three months. Although their labor costs went up about 5 per cent on Oct. 1, most firms are holding the line on prices. Some complain about cut-throat competition. "We bid 13 cents a pound on a big job recently and lost out to an eastern competitor who bid 8 cents," a local foundry declares.

***Cleveland***— Suppliers of aluminum and magnesium castings for the Army's missile program received a pat on the back here from Brig. Gen. John A. Barclay, commanding general, Army Ballistic Missile Agency, Huntsville, Ala.

Speaking before the recent annual meeting of the Society for Nondestructive Testing, General Barclay said, "Sound-porosity-free castings for missile use, once extremely difficult to procure, are today becoming available from an increasingly greater number of sources. The qualification of these sources has been brought about, first, by the education of the industrial engineers as to the specific missile problems, and, secondly, by the co-operation of the industrial sources furnishing supplies to our laboratories."

Extensive use of x-ray inspection was given considerable credit by General Barclay for improving the quality of Army missiles. It has resulted, he said, in far more than merely a good weld or a good casting. "It has prompted an exhaustive study of weldments and castings themselves."

***Philadelphia***— Gray iron business is edging up, but it is spotty. One sizable job shop experienced the best month in October in more than a year and estimated that November business was being sustained on a daily average. In general, however, job shops are averaging little over three days a week, and even then with restricted labor forces. They are promising maximum deliveries of around two weeks.

Among the more sustained requirements are those for power transmissions, material handling equipment, electrical equipment, and building castings. There is a fairly good demand for steam specialties and pressure pipe.

While operating at a somewhat better level than the gray iron foundries, steel jobbers apparently are not doing quite as well as a month ago. But they are averaging around four days a week, with backlogs ranging three to four weeks. Ship work, material handling equipment, gears, and truck parts appear to be holding up best.

Business with the malleable shops is fairly brisk. This applies particularly to those producing pipe fittings, small electrical components, and building hardware. This lat-

**MALLEABLE PROMOTION: For the purpose of promoting the use of malleable iron castings, 41 malleable foundries have joined together to form the Malleable Castings Council. An extensive advertising campaign is planned to be started next January. Council officers include, left to right, James T. Dougherty, Canton Malleable Iron Co., treasurer; Robert J. LaMarche, American Malleable Castings Co., president, and Charles A. Schneider, National Malleable & Steel Castings Co., vice president**

# GUARANTEED TO OUTWEAR

## Any Other Blast Nozzle on the Market . . .

## NORBIDE* Pressure Blast Nozzles

These popular Norton Nozzles — lined with boron carbide — the hardest molded material commercially available — are backed by this solid guarantee in effect for over 20 years:

***750 Hours with silica sand***
***1500 Hours with steel shot or grit***

Before you buy nozzles, compare the facts. Weigh this solid guarantee against others, then try NORBIDE Boron Carbide Nozzles. You'll find they outwear other nozzles by hundreds of hours.

**Here's Why We Can Make This Guarantee:**

| Actual Comparative Hardness — Nozzle Materials — Knoop Scale | |
|---|---|
| Ordinary cast iron | 150-200 |
| Cemented tungsten carbide | 1400-1800 |
| Bonded $Al_2O_3$ (Alumina ceramic) | 2000 |
| NORBIDE Boron Carbide | 2800 |

*For full details on cost-cutting NORBIDE Nozzles — write for folder Form 543.*

*Trade Mark Reg. U. S. Pat. Off.

**NORTON COMPANY**
**43 New Bond Street**
**Worcester 6, Mass.**

NORTON
BORON CARBIDE

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — BEHR-MANNING DIVISION • Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

# NON-FLUID OIL

TRADE MARK REGISTERED

## FOR BETTER SHAKE-OUT LUBRICATION

Lubrication of anti-friction bearings in vigorous foundry shake-out operations presents no problem if NON-FLUID OIL is used. This modern lubricant "stays alive" longer and its over-all performance is vastly superior to that of ordinary grease.

Manufacturers of shake-out equipment use NON-FLUID OIL and recommend its continued use to ensure longest life for vital roller bearings. NON-FLUID OIL will not pit or discolor the finest polished surfaces and its purity remains unchanged despite age, heat or exposure.

Send today for Bulletin 559 and a free sample of the lubricant that meets the most exacting standards of shake-out and bearing manufacturers. You will be convinced of its superior performance when you try it in your operations.

NEW YORK & NEW JERSEY
LUBRICANT COMPANY

292 Madison Ave., New York 17, N. Y.

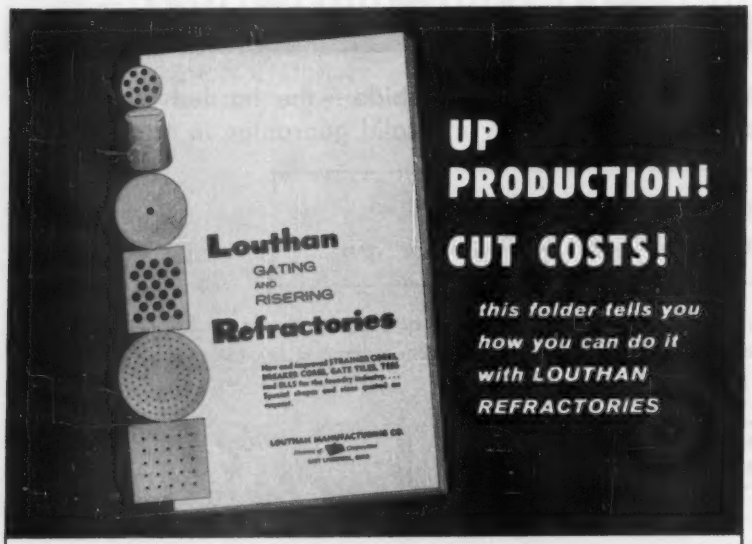
WORKS: NEWARK, N. J.

WAREHOUSES:

Birmingham, Ala. Columbus, Ga. Greenville, S. C. Springfield, Mass. Detroit, Mich.
Atlanta, Ga. Charlotte, N. C. Chicago, Ill. Greensboro, N. C. Providence, R. I.
St. Louis, Mo.

Circle 665 on Page 51






UP PRODUCTION!
CUT COSTS!

*this folder tells you how you can do it with LOUTHAN REFRACTORIES*

Keep your file up to date on the newest high-performance, cost-reducing foundry refractories. Breaker cores, strainer cores, gate tiles —the entire line of Louthan's popular gating and risering refractories.

Write for one or more free file copies today.

THE Louthan MANUFACTURING COMPANY

A DIVISION OF FERRO CORPORATION

EAST LIVERPOOL, OHIO

Circle 666 on Page 51


ter is true despite some competition from abroad, particularly from Japan. Foreign competition on building hardware is said to be far more noticeable on the Pacific Coast than in the East.

In nonferrous, most captive shops seem to be doing very well, especially those engaged in ship requirements, industrial pumps, meters, and plumbing supplies. However, there appears to be no particular overflow in any line, and the independent shops are suffering accordingly. Business of the brass and bronze jobbers is perking up a trifle, with operations averaging around three days a week. Aluminum shops also are doing better, especially on miscellaneous sand cast work.

Pig iron producers in West Germany and Holland are undercutting the domestic market by at least several dollars a ton. Japan, France, Yugoslavia, and West Germany, among others, are offering ferromanganese here, undercutting by $40 a ton and more, it is reliably reported. However, the E. J. Lavino ferromanganese furnace at Sheridan, Pa., was relighted Nov. 15, after having been idle since early in the year, when it was closed for relining and repairs. The pig iron furnace of Colorado Fuel & Iron Corp. at Birdsboro, Pa., and the second furnace of Alan Wood Steel Co. at Swedeland, Pa., have been blown in within recent weeks.

***Chicago***— Armour Research Foundation of Illinois Institute of Technology dedicated a $1.2 million addition to its Metals Research Building here Oct. 20. The event marked completion of the second step in a 10-year expansion program announced by the Foundation early in 1956.

The four-story addition more than doubles the department's space for metals projects, giving a total of 68,000 sq ft. The original three-story metals building was the first to be erected on the modern Illinois Institute campus. It was constructed in 1942 to house metals research on war projects.

Need for the new building grows out of the increasing volume of metals research at Armour Research Foundation. Space in the addition is allotted to bench-work-style laboratories and offices while the original building will be used for heavy equipment research. In the new building are research sections of electrochemistry and applied powder, reactor, physical and nonferrous metallurgy, as well as new re-

ception and administration offices. A creep laboratory is in the basement. The original metals building houses pilot-plant and other large-scale operations, including the welding, foundry and steelmaking, and metallurgical processes sections.

Industrial foundry practices involving melting, molding, and the design of molds and castings, are being improved constantly by research scientists in the foundry and steelmaking section. Studies involve ferrous and nonferrous metals.

The research foundry works with shell molding, refractory setting molds, permanent molds, investment molds, molded carbons, waterless sands, foundry sands and related materials.

Typical projects of current interest are precision casting of forging dies; improvement of shell molding mixes; use of carbons for chills; nongalling cast stainless steels; development of waterless molding sands; press-forming of castings; steel casting studies relative to fluid flow, gating, and hot tearing; control for shrinkage in zinc-base alloys; and desulfurization investigations.

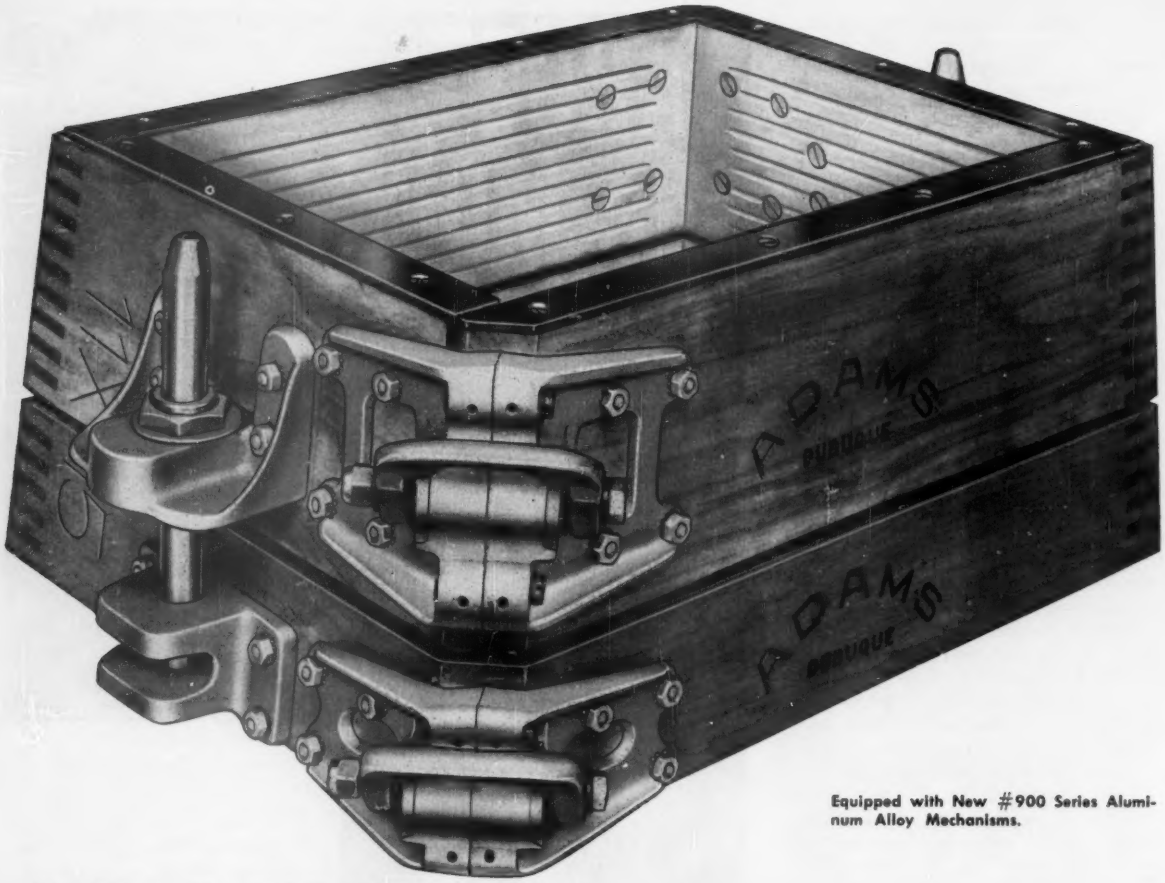
The foundry is well equipped to conduct research in all phases of melting techniques, metals development, sand controls, formulation and other subjects. Equipment includes induction melting furnaces, gas-fired melting furnaces, a vacuum induction melting furnace, a cupola, experimental shell molding machinery, jolt-squeeze sand molding machine, core blower, sand laboratory, and sand blasting equipment.

## New Foundry Noise Manual Is Published by AFS

To provide management with information to meet industrial requirements in prevention of hearing loss, the American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill., has published a new *Foundry Noise Manual*. Text matter covers pre-employment audiograms as a protection against workmen's compensation claims, industry's liability in hearing losses, generation, intensity and frequency factors of noise, and physiological aspects of hearing losses among employees.

Causes and effects of hearing impairment, advisability and methods of routine checks, corrective measures for meeting noise control problems, and protective equipment are also discussed. Price of the manual is $4.75.

TARGET the MOON!
When the first space craft reaches the moon, it will owe part of its success to the high purity of the various alloys used to cast many of its parts . . . metal that was melted in CRUCIBLES.
Whether you're making valves or Vanguards, gear-cases or guided missiles, CRUCIBLE MELTING is the most flexible, reliable and economical means of obtaining high purity metal — in any quantity — quickly and economically!
These manufacturers are ready to assist you with melting and pouring problems, foundry layouts and crucible furnace servicing.
• VESUVIUS CRUCIBLE COMPANY
• AMERICAN REFRACTORIES & CRUCIBLE CORPORATION
• JOSEPH DIXON CRUCIBLE CO.
• ELECTRO REFRACTORIES & ABRASIVES COMPANY
• LAVA CRUCIBLE-REFRACTORIES COMPANY
• ROSS-TACONY CRUCIBLE CO.
Crucible Manufacturers' Association
—CLIP and MAIL for FREE Brochure—
CRUCIBLE MANUFACTURERS ASSN.
11 West 42nd Street, N. Y. 36, N. Y.
Send "Crucible Charlie" Brochure #7 Base Blocks and Furnace Covers.
Send "Crucible Charlie" Brochure #8 Installations and Maintenance.
NAME
POSITION COMPANY
ADDRESS
CITY STATE




Equipped with New #900 Series Aluminum Alloy Mechanisms.

# ADAMS CHERRY EASY-OFF FLASK

## MAKE REAL SAVINGS FROM THESE ADVANTAGES!

CHERRY EASY-OFF FLASKS are of proven design and construction.

CHERRY LUMBER is the finest available, carefully selected and thoroughly air dried.

SIDES AND ENDS finished 1⅛" on all standard size flasks. 1¼" and heavier on flasks of larger perimeters and greater depths.

SOLID CORNERS are machine dovetailed and maintained in rigidness through dipping in "Hot Glue" and machine locking.

ALUMINUM ALLOY TRIMMINGS are also used on Adams Aluminum Easy-Off Flasks when specified.

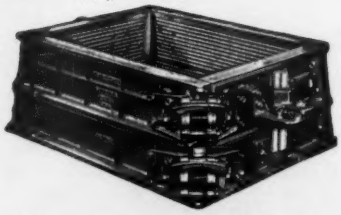
OPERATING MECHANISMS are identical with those used on the Adams Aluminum Easy-Off Flask and incorporate the same simple adjustment and reversal of locking position.

STEEL PROTECTING STRIPS are standard equipment at top, bottom and parting. Aluminum strips available upon request at no extra charge.

HANDLES AND TRUNNIONS are available when specified, Tee Iron Trusses if required.

PIN AND EAR ARRANGEMENT available to interchange with present pattern plate guides.

**A COMPLETE LINE. Adams flask equipment meets your requirements in practically all methods of production. Before you invest, get the Adams story first. Write today for our big profit-making catalog.**



Adams Aluminum Easy-Off Flask

Adams Jackets, Cast Iron or Aluminum

## The ADAMS Company

Dubuque, Iowa

*1883 75 years of progress 1958*

# Foundry Statistics

## ALUMINUM

(Shipments of castings—1000 pounds[1])

| | Shipments | | | | Unfilled Orders[2] |
|---|---|---|---|---|---|
| | Total | Sand | Perm. Mold | Die | |
| 1956 | 794,581 | 171,181 | 245,421 | 376,230 | ..... |
| 1957 | | | | | |
| Aug. | 55,735 | 10,996 | 18,398 | 26,319 | 89,826 |
| 8 mo. | 516,824 | 101,501 | 158,628 | 265,479 | ..... |
| Sept. | 58,692 | 11,367 | 17,820 | 24,900 | 93,720 |
| Oct. | 64,140 | 11,570 | 20,543 | 31,936 | 91,817 |
| Nov. | 58,898 | 10,411 | 18,611 | 29,793 | 91,860 |
| Dec. | 53,102 | 9,302 | 16,724 | 26,978 | 86,323 |
| Total | 751,656 | 144,151 | 232,326 | 369,086 | ..... |
| 1958 | | | | | |
| Jan. | 57,845 | 10,724 | 18,082 | 28,937 | 77,067 |
| Feb. | 50,695 | 9,601 | 15,456 | 25,279 | 75,647 |
| Mar. | 50,547 | 9,311 | 15,255 | 25,918 | 63,600 |
| Apr. | 44,948 | 9,531 | 13,369 | 21,956 | 60,317 |
| May | 44,093 | 9,312 | 13,648 | 21,091 | 59,666 |
| June | 40,701 | 8,644 | 13,679 | 18,292 | 63,670 |
| July | 38,818 | 8,658 | 12,342 | 17,714 | 68,618 |
| Aug. | 45,034 | 9,034 | 14,426 | 21,505 | 71,135 |
| 8 mo. | 372,681 | 74,815 | 126,257 | 180,692 | ..... |

## MALLEABLE IRON

(Shipments of castings—net tons[1])

| | Shipments | | | | | | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|
| | Total | For Sale | Standard Total | Standard For Sale | Pearlitic Total | Pearlitic For Sale | |
| 1956 | 951,868 | 557,636 | 812,905 | 479,563 | 138,963 | 78,073 | ..... |
| 1957 | | | | | | | |
| Aug. | 65,426 | 39,644 | 55,320 | 33,781 | 10,106 | 5,863 | 84,876 |
| 8 mo. | 594,523 | 363,304 | 490,957 | 302,481 | 103,566 | 60,823 | ..... |
| Sept. | 62,457 | 38,397 | 52,281 | 31,658 | 10,176 | 6,739 | 83,385 |
| Oct. | 77,667 | 45,989 | 66,043 | 39,269 | 11,624 | 6,720 | 82,995 |
| Nov. | 67,904 | 38,085 | 55,564 | 31,036 | 12,340 | 7,049 | 80,074 |
| Dec. | 60,425 | 34,343 | 48,694 | 27,218 | 11,731 | 7,125 | 74,863 |
| Total | 862,976 | 520,118 | 713,539 | 431,662 | 149,437 | 88,456 | ..... |
| 1958 | | | | | | | |
| Jan. | 62,734 | 34,920 | 51,440 | 28,516 | 11,294 | 6,404 | 67,292 |
| Feb. | 54,650 | 31,006 | 45,419 | 25,381 | 9,231 | 5,625 | 59,047 |
| Mar. | 51,708 | 29,624 | 43,368 | 24,333 | 8,340 | 5,291 | 54,330 |
| Apr. | 50,695 | 29,388 | 41,794 | 23,605 | 8,901 | 5,783 | 47,664 |
| May | 48,306 | 26,656 | 40,092 | 21,710 | 8,214 | 4,946 | 46,603 |
| June | 51,882 | 31,077 | 42,910 | 25,679 | 8,972 | 5,398 | 48,280 |
| July | 41,865 | 24,479 | 33,857 | 20,023 | 8,008 | 4,456 | 58,340 |
| Aug. | 49,252 | 29,414 | 41,734 | 24,696 | 7,518 | 4,718 | 55,145 |
| 8 mo. | 411,082 | 235,564 | 340,674 | 193,943 | 70,478 | 42,621 | ..... |

## COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

| | Shipments | | | Unfilled Orders[2] |
|---|---|---|---|---|
| | Total | Sand | Perm. Mold | |
| 1956 | 966,306 | 866,545 | 57,522 | ..... |
| 1957 | | | | |
| Aug. | 71,233 | 64,953 | 3,278 | 40,446 |
| 8 mo. | 586,845 | 526,908 | 31,758 | ..... |
| Sept. | 70,804 | 64,470 | 3,243 | 40,298 |
| Oct. | 81,836 | 74,391 | 3,693 | 39,063 |
| Nov. | 70,187 | 63,944 | 3,006 | 34,249 |
| Dec. | 65,708 | 59,606 | 3,046 | 31,509 |
| Total | 875,389 | 788,319 | 44,696 | ..... |
| 1958 | | | | |
| Jan. | 69,707 | 63,294 | 3,327 | 30,341 |
| Feb. | 58,356 | 52,579 | 3,202 | 27,243 |
| Mar. | 60,157 | 54,007 | 3,395 | 25,434 |
| Apr. | 59,311 | 53,271 | 3,385 | 25,621 |
| May | 57,506 | 51,634 | 3,077 | 22,867 |
| June | 57,124 | 51,967 | 3,001 | 21,578 |
| July | 51,124 | 46,636 | 2,351 | 20,518 |
| Aug. | 57,790 | 52,981 | 2,425 | 24,851 |
| 8 mo. | 471,045 | 426,369 | 24,163 | ..... |

## MAGNESIUM

(Shipments of castings—1000 pounds[1])

| | Shipments | | Unfilled Orders[2] |
|---|---|---|---|
| | Total | For Sale | |
| 1956 | 36,168 | 33,580 | ..... |
| 1957 | | | |
| Aug. | 2,315 | 2,150 | 6,222 |
| 8 mo. | 22,398 | 21,074 | ..... |
| Sept. | 2,279 | 2,071 | 5,705 |
| Oct. | 2,192 | 2,093 | 5,318 |
| Nov. | 1,920 | 1,806 | 4,802 |
| Dec. | 1,533 | 1,408 | 4,823 |
| Total | 30,322 | 28,452 | ..... |
| Jan. | 1,881 | 1,756 | 5,227 |
| Feb. | 1,803 | 1,730 | 5,589 |
| Mar. | 1,975 | 1,860 | 5,555 |
| Apr. | 2,215 | 2,141 | 5,555 |
| May | 2,422 | 2,196 | 5,200 |
| June | 2,205 | 1,996 | 5,515 |
| July | 2,200 | 2,063 | 6,706 |
| Aug. | 1,869 | 1,808 | 6,086 |
| 8 mo. | 16,570 | 15,550 | ..... |

## PRODUCTION WORKERS

Estimated Number

| | Aug. 1958 | July 1958 | Aug. 1957 |
|---|---|---|---|
| Ferrous | 155,700 | 159,200 | 199,300 |
| Nonferrous | 45,500 | 42,300 | 56,900 |

| Average Weekly Earnings | | | |
|---|---|---|---|
| Gray Iron | $83.70 | $84.22 | $84.97 |
| Malleable Iron | 86.26 | 84.83 | 83.33 |
| Steel | 91.50 | 91.50 | 95.27 |
| Nonferrous | 93.83 | 91.96 | 92.06 |

| Average Weekly Hours | | | |
|---|---|---|---|
| Gray Iron | 37.2 | 37.1 | 38.8 |
| Malleable Iron | 38.0 | 37.7 | 38.4 |
| Steel | 37.5 | 37.5 | 40.2 |
| Nonferrous | 40.1 | 39.3 | 40.2 |

Source: Bureau of Labor Statistics.

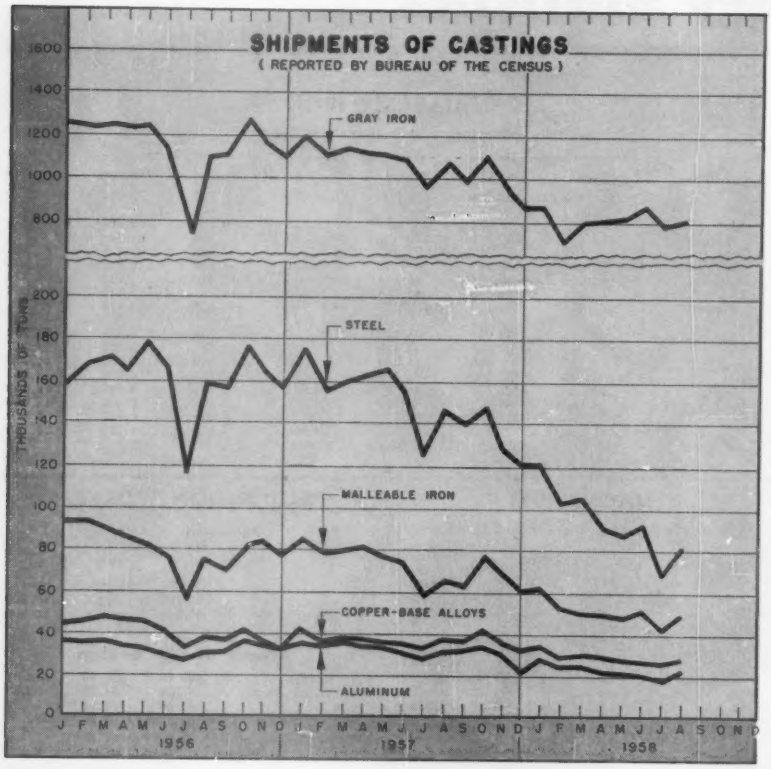
## GRAY IRON CASTINGS—SHIPMENTS (Net tons[1])

| | All Castings | | Miscellaneous Castings | | Nodular Iron Castings | Heavy Steel Ingot Molds | Chilled Railroad Car Wheels | Pressure Pipe & Fittings | Soil Pipe & Fittings | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | For Sale | Total | For Sale | Total | Total | Total | Total[3] | Total[3] | |
| 1956 | 13,860,527 | 7,960,391 | 8,265,526 | 3,647,991 | ..... | 2,624,146 | 406,191 | 1,746,902 | 817,762 | ..... |
| 1957 | | | | | | | | | | |
| Aug. | 1,075,957 | 596,779 | 630,130 | 265,185 | 10,339 | 205,655 | 28,976 | 138,209 | 72,987 | 825,676 |
| 8 mo. | 8,770,447 | 4,785,509 | 5,381,444 | 2,300,039 | ..... | 1,681,129 | 261,870 | 944,869 | 501,135 | ..... |
| Sept. | 990,139 | 563,477 | 579,444 | 259,649 | 10,253 | 202,914 | 23,681 | 119,689 | 64,411 | 805,301 |
| Oct. | 1,099,554 | 601,109 | 668,895 | 282,024 | 11,974 | 210,521 | 26,306 | 122,149 | 71,683 | 740,169 |
| Nov. | 940,138 | 482,732 | 599,292 | 242,847 | 10,601 | 166,652 | 24,302 | 91,138 | 58,754 | 704,623 |
| Dec. | 864,226 | 443,670 | 557,154 | 226,356 | 9,810 | 148,074 | 23,173 | 73,500 | 62,325 | 675,838 |
| Total | 12,664,504 | 6,876,497 | 7,786,229 | 3,310,915 | ..... | 2,409,290 | 359,332 | 1,351,345 | 753,306 | ..... |
| 1958 | | | | | | | | | | |
| Jan. | 868,255 | 436,398 | 580,545 | 229,014 | 10,800 | 135,110 | 23,511 | 78,863 | 50,226 | 638,089 |
| Feb. | 753,306 | 389,708 | 503,175 | 203,717 | 10,245 | 116,168 | 25,959 | 67,606 | 40,398 | 632,490 |
| Mar. | 795,568 | 446,822 | 499,751 | 215,916 | 9,485 | 125,887 | 24,777 | 87,716 | 57,437 | 589,912 |
| Apr. | 806,720 | 457,498 | 483,999 | 210,344 | 8,015 | 121,499 | 25,401 | 112,292 | 63,539 | 582,446 |
| May | 820,054 | 472,192 | 469,026 | 203,025 | 5,671 | 134,312 | 23,498 | 123,017 | 70,201 | 570,293 |
| June | 867,948 | 541,904 | 503,252 | 245,651 | 5,773 | 135,477 | 22,926 | 129,671 | 78,620 | 572,706 |
| July | 791,560 | 465,650 | 430,882 | 185,275 | 3,999 | 157,478 | 19,928 | 110,790 | 72,481 | 580,155 |
| Aug. | 802,473 | 513,862 | 410,876 | 205,821 | 4,211 | 165,006 | 18,537 | 129,157 | 78,897 | 614,199 |
| 8 mo. | 6,505,884 | 3,724,034 | 3,881,506 | 1,698,763 | 58,199 | 1,090,927 | 184,539 | 839,112 | 509,619 | ..... |

## STEEL CASTINGS—SHIPMENTS (Net tons[1])

| | All Castings | | | Carbon | | | Alloy | | | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | For Sale | Railway Specialties | Total | For Sale | Railway Specialties | Total | For Sale | Railway Specialties | |
| 1956 | 1,931,987 | 1,512,290 | 368,918 | 1,444,768 | 1,122,109 | 345,091 | 487,219 | 390,181 | 23,827 | ..... |
| 1957 | | | | | | | | | | |
| Aug. | 145,926 | 111,080 | 33,641 | 113,167 | 86,407 | 31,639 | 32,759 | 24,673 | 2,002 | 471,190 |
| 8 mo. | 1,232,890 | 950,359 | 237,569 | 930,673 | 714,761 | 220,863 | 302,217 | 235,598 | 16,706 | ..... |
| Sept. | 139,002 | 105,611 | 29,718 | 106,261 | 80,871 | 27,885 | 32,741 | 24,740 | 1,863 | 438,510 |
| Oct. | 146,397 | 113,216 | 31,477 | 110,100 | 85,144 | 29,320 | 36,297 | 28,072 | 2,157 | 395,907 |
| Nov. | 127,115 | 98,436 | 26,592 | 93,343 | 71,846 | 25,105 | 33,772 | 26,590 | 1,787 | 362,948 |
| Dec. | 120,787 | 92,125 | 23,403 | 88,101 | 66,468 | 21,808 | 32,686 | 25,657 | 1,595 | 327,337 |
| Total | 1,766,191 | 1,359,747 | 349,059 | 1,328,478 | 1,019,090 | 324,951 | 437,713 | 340,657 | 24,108 | ..... |
| 1958 | | | | | | | | | | |
| Jan. | 120,722 | 94,717 | 22,545 | 87,525 | 68,203 | 21,115 | 33,197 | 26,514 | 1,430 | 304,907 |
| Feb. | 103,297 | 79,708 | 16,647 | 74,283 | 56,781 | 15,273 | 29,014 | 22,927 | 1,374 | 282,358 |
| Mar. | 106,233 | 82,195 | 16,180 | 77,564 | 60,208 | 15,240 | 28,669 | 21,987 | 940 | 252,840 |
| Apr. | 91,464 | 69,121 | 11,956 | 65,639 | 48,998 | 11,107 | 25,825 | 20,123 | 849 | 229,503 |
| May | 87,002 | 66,086 | 10,416 | 61,105 | 45,967 | 9,463 | 25,897 | 20,119 | 953 | 211,346 |
| June | 92,861 | 71,624 | 14,185 | 67,227 | 50,919 | 12,987 | 25,634 | 20,705 | 1,198 | 190,779 |
| July | 68,802 | 48,618 | 5,400 | 46,858 | 32,161 | 4,656 | 21,944 | 16,457 | 744 | 200,272 |
| Aug. | 80,886 | 59,816 | 8,021 | 57,539 | 42,069 | 7,090 | 23,347 | 17,747 | 931 | 196,300 |
| 8 mo. | 751,267 | 571,885 | 105,350 | 537,740 | 405,306 | 96,931 | 213,627 | 166,549 | 8,419 | ..... |

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.




## COKE PRODUCTION AND CONSUMPTION

(Net tons*)

| | Production | Consumption Total | Consumption By Foundries |
|---|---|---|---|
| 1956 ... | 74,454,264 | 73,814,941 | 2,856,395 |
| 1957 | | | |
| Sept. ... | 6,130,300 | 6,201,100 | 199,400 |
| 8 mo. . | 58,852,500 | 58,540,600 | 1,929,900 |
| Oct. ... | 6,275,567 | 6,120,485 | 208,720 |
| Nov. ... | 5,615,746 | 5,425,296 | 199,052 |
| Dec. ... | 5,164,965 | 5,099,556 | 173,470 |
| Total . | 75,772,353 | 74,961,606 | 2,509,025 |
| 1958 | | | |
| Jan. ... | 4,762,050 | 4,643,022 | 192,098 |
| Feb. ... | 4,078,728 | 4,030,849 | 171,362 |
| Mar. ... | 4,343,326 | 4,208,343 | 168,194 |
| Apr. ... | 3,837,040 | 3,597,518 | 152,935 |
| May ... | 3,899,004 | 3,733,239 | 158,858 |
| June ... | 3,934,480 | 3,939,586 | 151,007 |
| July ... | 3,957,230 | 3,849,515 | 140,144 |
| Aug. ... | 4,314,648 | 4,282,989 | 165,100 |
| Sept. ... | 4,504,381 | 4,515,701 | 184,085 |
| 8 mo.[3]. | 37,629,340 | 36,799,266 | 1,484,796 |

## INGOT BRASS AND BRONZE

(Shipments in net tons)

| | 1957 | 1958 |
|---|---|---|
| Jan. | 25,681 | 20,468 |
| Feb. | 20,769 | 17,413 |
| Mar. | 21,948 | 18,825 |
| Apr. | 23,507 | 18,009 |
| May | 22,037 | 17,191 |
| June | 18,888 | 17,962 |
| July | 16,695 | 16,658 |
| Aug. | 19,654 | 17,882 |
| Sept. | 19,670 | 20,540 |
| Oct. | 22,800 | ..... |
| Nov. | 19,767 | ..... |
| Dec. | 16,875 | ..... |
| Total for year .... | 248,291 | ..... |

Source: Defense Council of the Ingot Brass and Bronze Industry.

## ZINC-BASE ALLOYS

(Shipments of castings—1000 pounds[1])

| | Shipments—Total | Shipments—For Sale | Unfilled Orders[2] |
|---|---|---|---|
| 1956 ..... | 693,728 | 449,516 | ..... |
| 1957 | | | |
| Aug. ..... | 49,829 | 34,040 | 64,789 |
| 8 mo. .. | 445,246 | 286,493 | ..... |
| Sept. ..... | 47,736 | 33,838 | 68,122 |
| Oct. ..... | 62,332 | 39,990 | 69,275 |
| Nov. ..... | 58,689 | 35,005 | 63,665 |
| Dec. ..... | 49,597 | 29,998 | 58,792 |
| Total .. | 663,600 | 425,334 | ..... |
| 1958 | | | |
| Jan. ..... | 50,568 | 30,368 | 55,883 |
| Feb. ..... | 42,687 | 27,482 | 59,676 |
| Mar. ..... | 39,719 | 26,782 | 43,366 |
| Apr. ..... | 35,796 | 23,830 | 27,634 |
| May ..... | 36,447 | 24,588 | 33,438 |
| June ..... | 38,132 | 25,993 | 34,888 |
| July ..... | 32,765 | 22,843 | 41,534 |
| Aug. ..... | 35,860 | 26,971 | 45,066 |
| 8 mo. .. | 311,974 | 208,857 | ..... |

## INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

| | 1957 | 1958 |
|---|---|---|
| Jan. ..... | 117.9 | 57.9 |
| Feb. ..... | 188.4 | 57.6 |
| Mar. ..... | 127.0 | 85.9 |
| Apr. ..... | 101.1 | 88.7 |
| May ..... | 136.2 | 136.1 |
| June ..... | 187.5 | 87.7 |
| July ..... | 98.6 | 77.9 |
| Aug. ..... | 231.3 | 74.1 |
| Sept. ..... | 113.9 | .... |
| Oct. ..... | 145.3 | .... |
| Nov. ..... | 59.6 | .... |
| Dec. ..... | 61.4 | .... |

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.

## IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

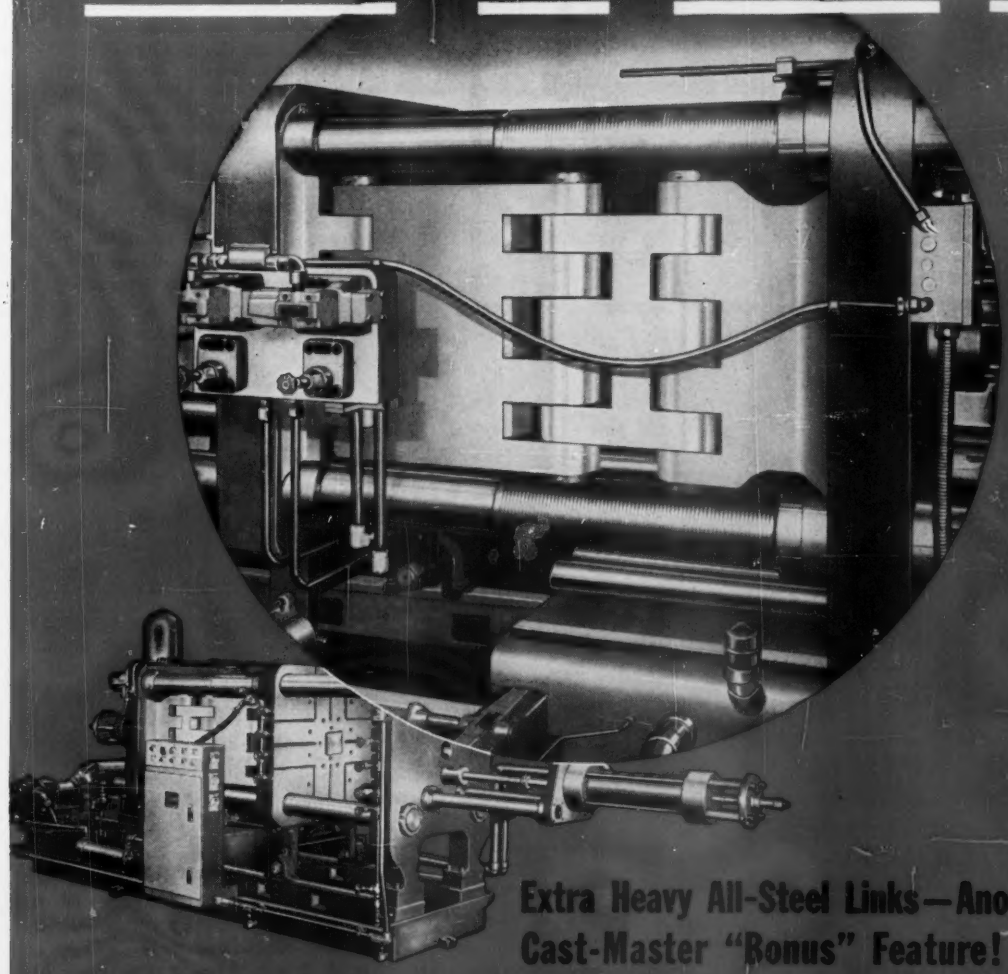
| | All Scrap Total | By Types of Furnace—Cupola Total | Air Total | Electric Total |
|---|---|---|---|---|
| 1956 ..... | 71,709,489 | 9,817,287 | 1,133,128 | 9,862,887 |
| 1957 | | | | |
| June ..... | 5,430,607 | 744,790 | 80,063 | 705,590 |
| 6 mo. ... | 35,963,629 | 4,885,279 | 558,830 | 4,965,213 |
| July ..... | 4,597,752 | 652,773 | 68,504 | 629,395 |
| Aug. ..... | 5,299,543 | 765,877 | 81,941 | 759,517 |
| Sept. ..... | 5,033,998 | 721,125 | 82,948 | 672,597 |
| Oct. ..... | 5,333,767 | 817,338 | 91,766 | 718,791 |
| Nov. ..... | 4,858,489 | 716,095 | 72,871 | 589,879 |
| Dec. ..... | 4,281,414 | 661,918 | 70,091 | 542,008 |
| Total ... | 65,688,592 | 9,220,405 | 1,026,951 | 8,876,400 |
| 1958 | | | | |
| Jan. ..... | 4,072,071 | 704,654 | 76,989 | 566,225 |
| Feb. ..... | 3,491,441 | 611,394 | 64,971 | 466,657 |
| Mar. ..... | 3,718,132 | 624,165 | 64,866 | 524,035 |
| Apr. ..... | 3,429,121 | 599,427 | 61,839 | 531,220 |
| May ..... | 3,862,491 | 596,253 | 59,060 | 553,756 |
| June ..... | 4,409,006 | 615,271 | 62,703 | 605,733 |
| 6 mo. ... | 22,982,262 | 3,751,164 | 390,428 | 3,247,626 |

## PIG IRON PRODUCTION AND CONSUMPTION

| | Production**—Net Tons—Total | Foundry | Malleable & Silvery | Basic | Low Phos. Intermediate Low Phos. & Bessemer | Consumption*—Gross Tons—Total | Cupola | Air | Electric |
|---|---|---|---|---|---|---|---|---|---|
| 1956 ..... | 75,301,134 | 2,402,861 | 3,733,258 | 61,900,276 | 7,264,761 | 66,967,618 | 4,786,011 | 261,377 | 211,193 |
| 1957 | | | | | | | | | |
| July ..... | 6,625,901 | 221,929 | 336,590 | 5,515,736 | 551,646 | 5,558,702 | 306,119 | 14,735 | 17,992 |
| 7 mo. .. | 47,889,558 | 1,345,180 | 2,284,274 | 49,862,662 | 4,397,442 | 41,178,246 | 2,536,918 | 135,448 | 136,494 |
| Aug. ..... | 6,719,763 | 228,378 | 298,269 | 5,451,691 | 741,425 | 5,769,995 | 349,968 | 17,540 | 25,948 |
| Sept. ..... | 6,569,074 | 218,297 | 292,244 | 5,272,056 | 786,477 | 5,645,036 | 321,728 | 17,084 | 28,638 |
| Oct. ..... | 6,454,450 | 164,944 | 303,104 | 5,390,851 | 595,551 | 5,669,624 | 354,364 | 18,466 | 24,691 |
| Nov. ..... | 5,711,242 | 153,723 | 290,547 | 4,759,255 | 507,718 | 5,073,898 | 309,674 | 14,886 | 17,199 |
| Dec. ..... | 5,212,624 | 165,268 | 223,897 | 4,394,869 | 423,590 | 4,565,635 | 288,219 | 14,754 | 13,881 |
| Total[3] .. | 78,557,011 | 2,275,789 | 3,697,335 | 65,131,684 | 7,452,203 | 67,902,434 | 4,160,891 | 218,178 | 246,851 |
| 1958 | | | | | | | | | |
| Jan. ..... | 4,785,269 | 100,097 | 232,802 | 4,036,451 | 415,859 | 4,208,692 | 306,794 | 16,102 | 14,426 |
| Feb. ..... | 4,016,276 | 106,921 | 193,429 | 3,396,382 | 319,094 | 3,551,679 | 260,940 | 14,014 | 7,740 |
| Mar. ..... | 4,418,778 | 156,386 | 227,785 | 3,645,353 | 389,254 | 3,824,140 | 270,214 | 13,472 | 8,753 |
| Apr. ..... | 3,787,907 | 136,180 | 173,139 | 3,053,634 | 424,954 | 3,378,893 | 262,007 | 13,975 | 9,585 |
| May ..... | 4,048,328 | 127,438 | 165,045 | 3,359,836 | 396,009 | 3,691,550 | 256,204 | 12,001 | 11,764 |
| June ..... | 4,396,285 | 121,869 | 167,192 | 3,764,607 | 342,617 | 4,058,714 | 262,883 | 12,098 | 15,549 |
| July ..... | 4,277,515 | 123,075 | 156,582 | 3,595,008 | 402,850 | ..... | ..... | ..... | ..... |
| 7 mo.[3] .. | 29,730,198 | 871,966 | 1,282,332 | 24,927,783 | 2,648,117 | ..... | ..... | ..... | ..... |

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

# BUILT TO TAKE IT



## Extra Heavy All-Steel Links—Another Cast-Master "Bonus" Feature! . . .

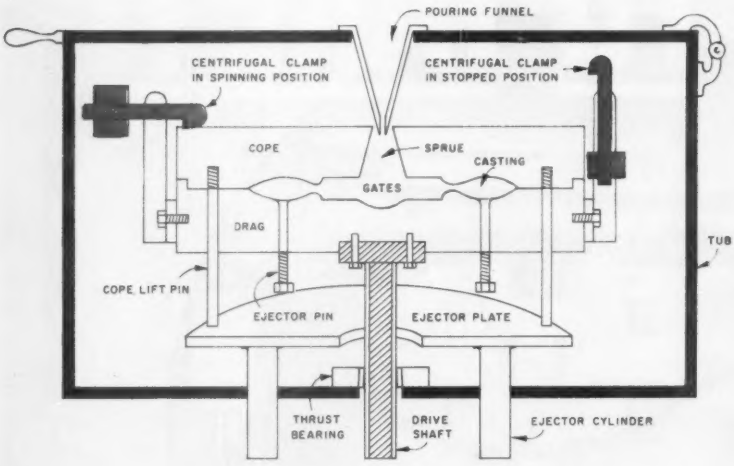
The story of Cast-Master quality is a story of "bonus" features — like the link system shown here. Cast-Master links are super-rugged — all-steel — machined — with wide spread for positive lock-up, and multiple shear points to eliminate link pin breakage. Result? — more precision — lower maintenance costs for Cast-Master owners. To get the complete "bonus" story, send for the new Cast-Master catalog.

**Eastern Rep.** Milton Harmon, 223 Pine Tree Drive, Orange, Connecticut
**Midwest Rep.** C. W. Stone Co., Minneapolis, Minnesota
**Western Rep.** Sydney J. Wills, 2120 Strand, Hermosa Beach, Calif.
**Central-West Rep.** Earl L. Johnson, 1696 Webster Lane, Des Plaines, Illinois

**CAST-MASTER *Inc.*** 23901 AURORA ROAD BEDFORD, OHIO

# Trouble Shooting

By C. W. AMMEN




Drawing illustrates setup for centrifugal casting of small permanent mold aluminum and zinc-base castings

## Centrifugal Permold Castings

Dear Charlie:

We have made a small number of centrifugal castings in dry sand molds with nice results. We understand, however, that permanent molds also can be spun with good results. We tried a small horizontal permold, but the rigging was clumsy. For example, too many clamps had to be tightened and untightened. Perhaps you can give us some information on simple rigging for centrifugal casting of small aluminum parts in permolds.

Sincerely,
Sam

Dear Sam:

The foundry industry has unlimited room for the development of new and simple production methods and equipment. There is nothing new about centrifugal permolds, and it would seem that their use would be more widespread. Most foundrymen probably stick to conventional practice to play it safe.

Design your permold to be poured and gated horizontally, much the same as a conventional green sand mold. Your chances of success thereby are increased by 100 per cent, with one heck of a simpler setup and fewer risers. Spin the horizontal permold, and your chances will pick up another 100 per cent. Castings can be made with very erratic walls and sections, and dimensional changes are achieved with much more ease and simpler riggings.

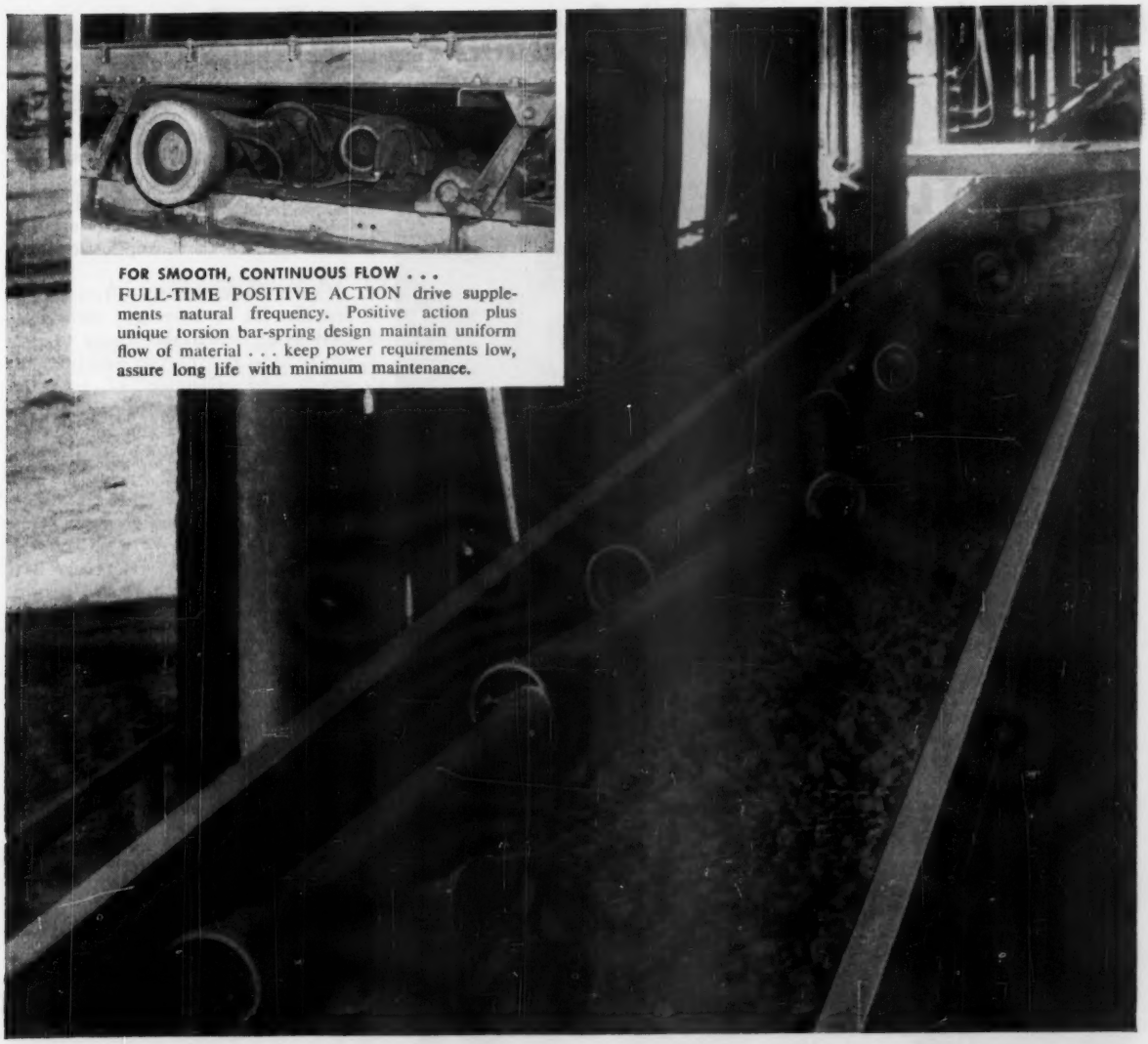
**"Centrifugal Diecasting"** — One fellow I know some time back was grinding out aluminum and zinc-base castings like hot cakes by a so-called secret method which required small gates and no risers. He called his system centrifugal diecasting. Spinning a horizontally parted permold was his big secret. Of course, quantity often dictates the method chosen. If you have a sufficient number of castings to produce and they lend themselves to centrifugal permanent molding, it is a rewarding method.

There are various methods of clamping, and all give results. The simplest and the best method I have seen in this type of work is the use of hinged weights, so arranged that when the permold is spun, the weights fly outward by centrifugal force and clamp the cope tightly in position. When the mold is braked to a stop, these weights descend, releasing the cope for easy removal.

You should have at least six centrifugal clamps spaced equally around the circumference of the mold. Ejectors are headed and spring loaded (closed). They extend down through the drag and are actuated when the machine comes to rest by the ejector plate, which can be operated either manually or by air.

The cope can be removed by hand or lift pins, depending also on size, shape, weight. Should the cope be abnormally long or have to be lifted to a great height to remove the casting or castings, ejector pins are required. The whole ejector box can be built to rotate with the mold.

Of course, some castings require no ejectors at all and are removed simply by lifting them out by the sprue, with tongs. The entire rotating mold is encased in a tub with a cover. There should be a switch,



**FOR SMOOTH, CONTINUOUS FLOW . . .** FULL-TIME POSITIVE ACTION drive supplements natural frequency. Positive action plus unique torsion bar-spring design maintain uniform flow of material . . . keep power requirements low, assure long life with minimum maintenance.

# Handling "piping hot" castings with 83% less man-hours

## LINK-BELT oscillating conveyor collects . . . conveys . . . cools red-hot pipe at Western Foundry Co.

Nothing less than a Link-Belt Torqmount oscillating conveyor could answer the requirements of Western Foundry Co., Tyler, Texas. Red-hot cast iron pipes had to be collected and conveyed from a line of automatic spinning machines to storage area. In addition, this foundry wanted a piece of equipment that would shake the sand out of the pipe as well as separate it from the castings. Link-Belt oscillating conveyor with *full-time positive action* performs all these functions . . . refuses to dampen under heavy surge loading conditions. The 141 ft. long conveyor line handles over 1700 five-foot pipes per shift, cooling them en route to storage.

This installation has also brought about tremendous manpower savings. Fifteen of 18 men tied up by previous methods have been freed for more productive jobs elsewhere in the foundry.

For further information on how heavy-duty Torqmount can benefit your foundry, call your nearest Link-Belt office. Or write for Book 2444.

**LINK-BELT**

**OSCILLATING CONVEYORS**

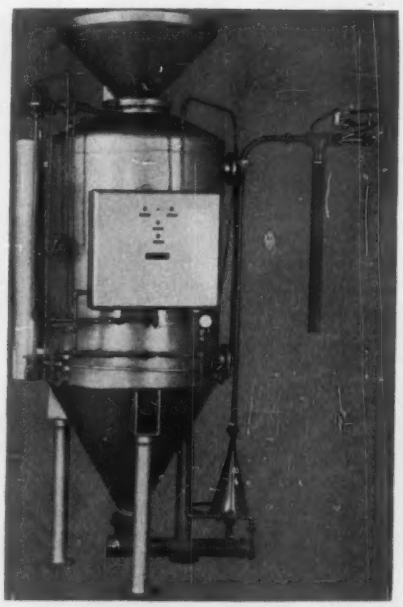
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,084

# Revolutionizes Sand Systems

the
**HARTLEY**
**BOND FEEDER**

- MEASURES
- TRANSPORTS
- SPEEDS-UP

Hartley,—originator of automatic moisture controls for sand systems, invites inquiries on its newest development illustrated here. Hopper sizes start at 28 cu. ft. Bond is transported to mixer in precisely measured quantities which can be changed instantly. May be located at floor level, or below, any distance from mixer. Ideal for multiple mixing units operating from same hopper.



HARTLEY Controls CORPORATION

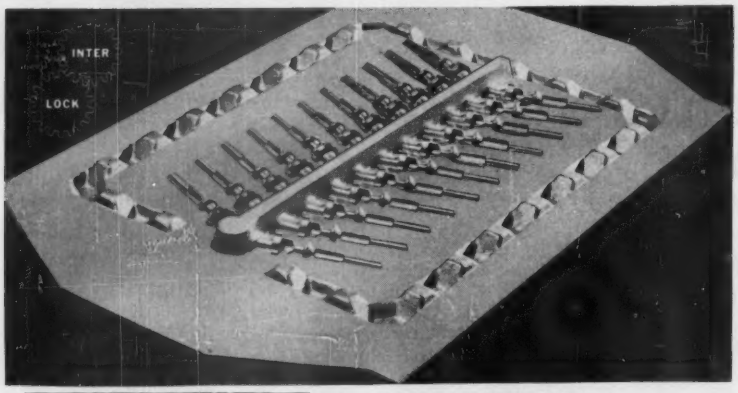
SPECIALISTS IN FOUNDRY CONTROLS

NEENAH • WISCONSIN

Circle 671 on Page 51

# FOUND!

**A NEW GUARD AGAINST MOLD HANDLING DAMAGE!**




# SCIENTIFIC GEFSCORP* MATCHPLATES

**REDUCE SCRAP LOSSES!! GEFSCORP INTER-LOCK BORDER SECURES MOLDS, PROTECTS AGAINST CONVEYOR LINE SHIFT, HANDLING JARS, BUMPS, JOLTS. FOUNDRIES REPORT . . . "BEST SAND LOCK YET!"**

**A SERIOUS IMPROVEMENT, WORTH A TRY**

**THE SCIENTIFIC CAST PRODUCTS CORP.**

CLEVELAND, OHIO
1390 E. 40th St.

CHICAGO, ILL.
2520 W. LAKE ST.

*Manufactured Under Licence from the GENERAL FOUNDRY SERVICES CORP., OAKLAND, CAL.


such as a mercury switch, which stops the motor and applies the electric brake when the cover is opened.

The metal is poured into the mold through a wooden or fiber funnel in the cover. Use a ladle containing the exact amount of metal necessary. Sometimes one mold will perform better when rotated in one direction and another when rotated in the opposite direction.

**Other Requirements**—You should provide for a reversing switch as well as for a variable speed to permit a little monkeying around with speed and direction of rotation, metal temperature, and coatings. You soon will find the set of conditions for each mold which provides the best yield.

Your clamping weights should be adjustable on their arms so that they can be moved in or out to change the amount of leverage and thus the clamping force. Novelty and toy manufacturers produce tons and tons of small castings by this system in low-temperature white metals and lead. They use specially prepared molds made of a rubber which will operate at temperatures up to and including 900° F. Many items such as fan spiders, pulleys, etc., lend themselves to this system.

Sincerely,
*Charlie*

## Book Review

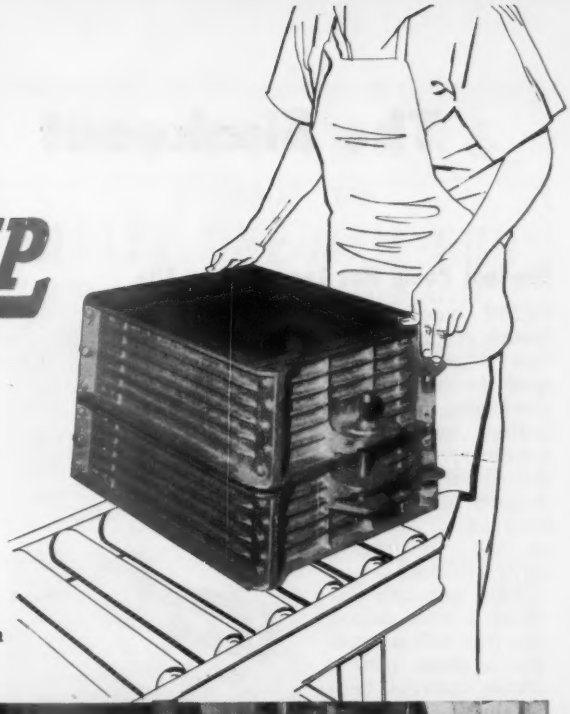
***Symposium on Determination of Gases in Metals,*** **hard cover, 66 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $2.25.**

This volume includes five papers presented at the June, 1957, meeting of the society which give a comprehensive view of current methods of determining gases in metals.

Papers include "Bromination-Carbon Reduction Method for the Determination of Oxygen in Metals" by Maurice Codell and George Norwitz; "Emission Spectrometric Determination of Oxygen in Metals" by V. A. Fassel, W. A. Gordon, and R. W. Tabeling; "Two Apparatus for Determination of Gases in Metals" by D. L. Guernsey and R. H. Franklin; "Application of Vacuum Fusion to Gas-Metal Studies" by W. G. Guldner and A. L. Beach, and "Oxygen Determination Using a Platinum Bath and Capillary Trap" by W. G. Smiley.

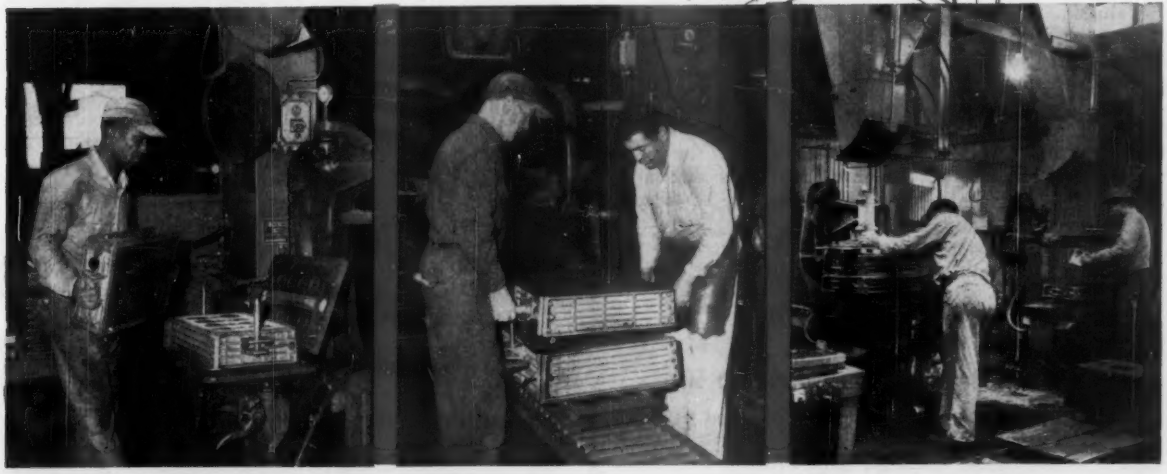
# Here's why Foundrymen are Standardizing on MONARCH KWIKSTRIP

## MECHANICAL CORNER FLASKS



**Mr. P. C. Rodger,** Plant Manager of the Vulcan Steel Foundry Co., Oakland, California, has stressed these features as reasons why their foundry has standardized on Monarch KWIKSTRIP Flasks:

- Finger-tip control of handle
- Sturdiness and accuracy
- Streamlined design — no sand adheres to sides of flask
- Quick interchangeability of parts at the molding station
- Minimum maintenance.



**H. C. MACAULAY FOUNDRY CO. Berkeley, California**

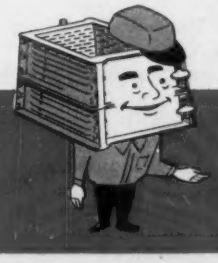
Photo above, left, shows a Monarch KWIKSTRIP Flask at use on 12" x 18" x 5" x 5" squeezer molds. Note the clean contour of the pattern impression made possible by the extreme accuracy of the flask as to squareness and taper. Smooth, easy draw is accomplished by the single round pins. Center photo shows a two-man cope and drag setup. Note the hardened steel wear strip at parting line and lifting handles. All working parts and guide bushings are cadmium plated to prevent rust. Pins are hard chrome plated.

Roy Kalin, Plant Manager, purchased the first Monarch KWIKSTRIP Flask built over nine years ago. Since then it has produced over 300,000 molds and is still in service . . . that's real proof of dependability.

**PACIFIC STEEL CASTINGS CO.**
**Berkeley, California**

Nino Davi, Foundry Superintendent, uses the Monarch KWIKSTRIP Flask exclusively, standardizing on one hex and one round pin. Photo above also shows the handle adapters in case the KWIKSTRIP Flasks are used for cope and drag setups.

Flasks are available also with double round and V-Type pins when desired.



*FLASKY SAYS: "Be production wise and standardize on KWIKSTRIP"*

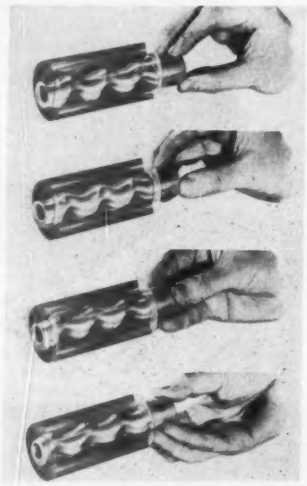
*Ask for Newaygo Bulletin 206 for Flasks, Jackets, Upsets and Accessories There's no obligation.*

**NEWAYGO** engineering company
NEWAYGO, MICHIGAN

*Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment*

# The Shakeout

## Unusual Pump Has Long Service Life



PUMP based on a French engineer's design is providing 30 times the life of pumps previously used in casting impregnating machinery. Known as the Moyno—after its designer, Rene J. L. Moineau—it operates on the "progressing cavity" principle.

This principle involves a rotor shaped as a true helical screw and a stator with a double internal helical thread. Eccentric movement of the rotor enables it to contact the entire stator surface in each complete revolution.

Pockets or voids between the stator and the rotor progress continuously and evenly toward the discharge end. Low internal turbulence, positive pressure, and uniform discharge are the results.

U. S. manufacturer of the pump is Robbins & Myers Inc., Springfield, Ohio.

For More Details Circle No. 449—Page 165

## Heat Resistant Belt Has Longer Service Life

THE PILE of foundry shakeouts pictured here is hot enough to bake a cake, yet does no harm to the heat resistant rubber conveyor belt, which is reinforced

with glass fabric. A temperature check reveals that sand carried by this B. F. Goodrich Solarflex belt normally ranges between 350 and 500° F, although belt temperature never exceeds 400° F.

Installed two years ago at Texas Foundries Inc., Lufkin, Tex., the hot material belt already has lasted seven times longer than belts used previously, and it reportedly looks good enough for another two years in this service. The belt has saved an estimated $3500 in belt replacement costs and has eliminated downtime losses which cost two and one-half tons of production every time a belt had to be replaced.

For More Details Circle No. 450—Page 165

## Diecastings Improve Quality, Reduce Costs

BY PRODUCING clarinet keys as zinc diecastings, C. G. Conn Co., Elkhart, Ind., is reported to have improved accuracy of the instruments and their parts at the same time that production costs were reduced greatly.

The old method involved brazing together as many as seven pieces for some assemblies. Piece rejection rate, breakage, and labor costs were high. The diecast parts have greater uniformity and accuracy, and the rejection and breakage rate is less than ½ of 1 per cent. Quality of the finish is better, and a high polish is achieved more economically. Parts are so accurate that they are used as gages to check holes, posts, and other parts of the body of the instrument.

For More Details Circle No. 451—Page 165

## Wire Thread Inserts Save Aluminum Castings

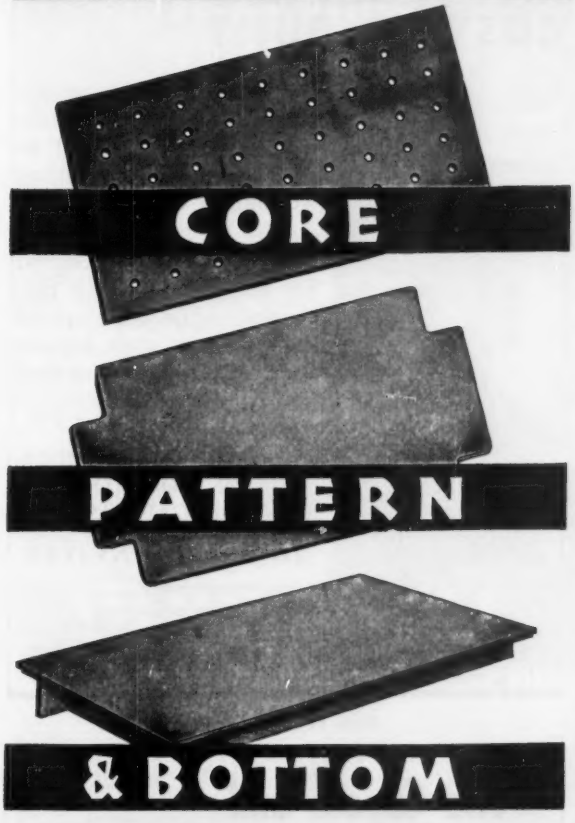
FORTY incorrectly heat treated aluminum castings valued at $2000 were salvaged with $50 worth of stainless steel wire thread inserts at Franklin Machine Products Co., West Trenton, N. J.

Machining operations on the castings included drilling and tapping twelve ¼ x ¾-in. holes at each end. When large steel flanges (left in photo) were bolted to the castings, the threads either stripped or chipped off, making final assembly impossible.

All of the castings were salvaged with a tap and inserting tool and the wire thread inserts, products of Heli-Coil Corp., a division of Topp Industries, Danbury, Conn. The damaged threads were drilled out and new ones tapped to accommodate the inserts, which were installed with an inserting tool, as shown.

For More Details Circle No. 452—Page 165

# MOLTRUP



CORE

PATTERN

& BOTTOM

# PLATES

for accurate casting results specify Moltrup Plates! They *stay flat* and *last longer* than other types—for Moltrup employs a special flattening process designed to permanently eliminate buckling or bending.

Consequently your investment goes further and that *all-important profit-margin* increases. Plates are made to your specifications—we welcome the opportunity to furnish complete information.

**MOLTRUP STEEL PRODUCTS COMPANY**

BEAVER FALLS, PA. (Pittsburgh District)

*Sales Offices in All Principal Cities*

# MOLTRUP

Circle 676 on Page 51



# *Why* LEADERS *Choose* THE RIDLEY ONE-MAN GUN

## FOR DAILY CUPOLA MAINTENANCE

(1) THE ONLY TRULY ONE-MAN OPERATED GUN.

(2) YOU SAVE: LABOR, MAINTENANCE, MATERIALS.

(3) BACKED BY SOLID REPUTATION OF RIDLEY (Pioneer-Engineer) IN THE AIR APPLICATION OF REFRACTORY MATERIALS.

PERFECT CIRCLE CORPORATION

PISTON RINGS - POWER SERVICE

HAGERSTOWN INDIANA U.S.A.

September 19, 1958

Mr. Richard L. Klosterman
Ridley and Company, Inc.,
11275 Massachusetts Avenue
Los Angeles 25, California

Dear Mr. Klosterman:

Ridley refractory guns are in use in our three Indiana foundries and our experience with them has been most satisfactory.

The convenience of one-man operation, with its resulting savings in time and labor, was the factor that first attracted us to the Ridley gun. We have since found that the large capacity of the Ridley gun, which eliminates repeated reloading, also results in a savings.

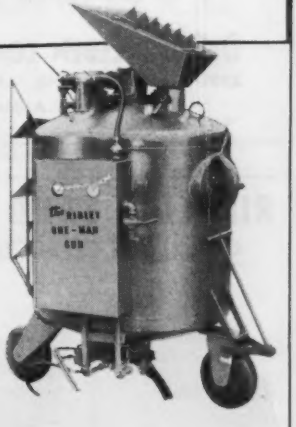
With your product, we are able to use a finer grain refractory material. We find this has cut waste since the material clings to the wall of the cupola. We have been able to cut lining time in half, and we anticipate longer service from our Ridley guns. Nozzle control, more power and a longer hose are other features we find to our liking.

At our Rushville foundry, where formerly we repaired cupolas with block, use of the Ridley gun has eliminated overtime and resulted in an actual savings of $15,211 in one year's time.

With such excellent performance, we're highly pleased with our Ridley refractory guns.

Sincerely,

Chesly B. Juday, Plant Manager
PERFECT CIRCLE CORPORATION
NEW CASTLE PLANT
h




**FOR FREE TRIAL, CONTACT NEAREST DISTRIBUTOR:**

**Ray F. Frings Company**
**1247 American Life Bldg.**
**Birmingham, Alamaba**

**Indiana Products Co.**
**1611 So. Lafayette Blvd.**
**South Bend 23, Indiana**

**Kaiser Aluminum and Chemical Sales, Inc.**
**3 Gateway Center**
**Pittsburgh 22, Pa.**

**Pennsylvania Foundry Supply and Sand Co.**
**Ashland below E. Lewis St.**
**Philadelphia 24, Pa.**

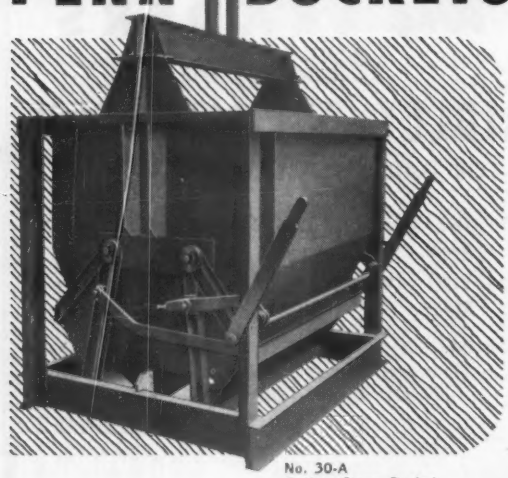
or write directly to—

## RIDLEY AND COMPANY, INC.

11275 MASSACHUSETTS AVENUE
LOS ANGELES 25, CALIFORNIA

Circle 677 on Page 51

# PENN BUCKETS



No. 30-A
Bottom Dump Bucket

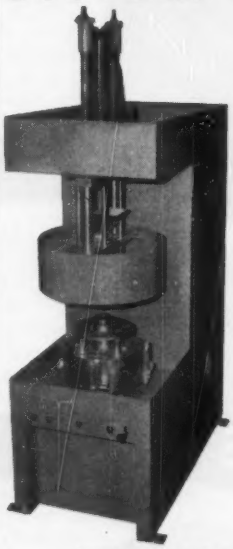
Exclusive design makes this bottom dump bucket easy to operate . . . easy to open. Efficient for foundry use in handling all types of sand, moulding or core, dry or prepared. Can be used with coke, scrap iron and castings also. Sizes 7 to 200 cu. ft.

Write Today for Catalog • Prices Quoted on Application

**PENN IRON WORKS, INC.**
READING, PENNA.

Circle 678 on Page 51

# CENTRIFUGAL CASTING MACHINES . . . WITH STANDARD PARTS AND EQUIPMENT CAN BE . . . CUSTOM BUILT



We make machines capable of producing castings weighing MANY TONS as well as machines to produce castings weighing a FEW OUNCES.

•

Some machines are designed for long-run repetitive production, while other special machines are most suitable for short runs of varying sizes and types of castings.

•

WE FURNISH INFORMATION ON HOW TO MAKE CENTRIFUGAL CASTINGS

*INQUIRIES INVITED*

INVESTIGATE THE POSSIBILITIES OF MAKING YOUR CASTINGS CENTRIFUGALLY . . . TODAY.

**CENTRIFUGAL CASTING MACHINE CO.**
P. O. BOX 947 TULSA 1, OKLAHOMA

Circle 681 on Page 51

# EMPIRE*

## "THAT GOOD" FOUNDRY COKE

**DEBARDELEBEN COAL CORPORATION**
2201 First Ave., North • Birmingham 3, Ala.
Phone: ALpine 1-9135
*Reg. U.S. Pat. Off

Circle 679 on Page 51

# RINGLIFT SAND CONDITIONER

GIVES YOU COST-CUTTING **MOBILITY**

The Ringlift Conditioner goes to the sand—cuts hauling and handling. Picks all sand off floor, screens it, aerates it, cools it, magnetically removes scrap, adds moisture, and lays it down in a neat windrow. One man operated. One user reports savings of $5,300.00 per year on sand conditioning. Send for literature.

**STATES ENGINEERING CORPORATION**
920 W. Berry St.
Fort Wayne, Indiana

Circle 680 on Page 51

# The Cupola and Its Operation

A comprehensive text on cupola operation for the metallurgist, foundryman and student of foundry technology . . . . . .

The 35 chapters are grouped into the following sections: Operations, Equipment, Materials, Principles related to Operation.

Latest developments, such as hot blast, basic lining for nodular iron, and emission control are covered. Chapters such as those on refractories, principles of combustion, and metallurgy have been greatly augmented or are presented for the first time. More than 50 of the country's outstanding foundrymen have contributed their knowledge and experience to make this book available on cupola operation.

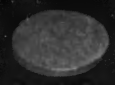
| | |
|---|---|
| 54 tables | Price: |
| 300 pages | $9.50 |
| 8 x 11 | Postpaid |

**FOUNDRY**
Book Department
1213 W. 3rd St., Cleveland 13, Ohio

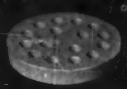
FOR BETTER CASTINGS...

UNIVERSAL

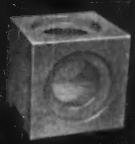
refractory gating components



Splash Cores



Strainer Cores



Determine proper gating faster, eliminate slag inclusions, stop rejects, reduce cleaning room time, and lower production costs. UNIVERSAL *refractory* gating components will help you do this, and at less cost than producing your own from sand. Send specifications for price and delivery quotations, or call MA 6-4912

WRITE TODAY FOR CATALOG LISTING SPECIFICATIONS OF STANDARD GATING COMPONENTS

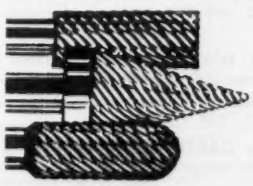
Pouring Tubes

UNIVERSAL CLAY PRODUCTS CO.

1515 EAST FIRST ST. • SANDUSKY, OHIO


Circle 682 on Page 51


WRITE FOR FREE CATALOG



★ Ground Cut Rotary Files for Soft Metals.
★ Hand Chisel Cut for Hard Metals.
★ Carbide Rotary Files.
★ Salvage and Regrinding Service.
★ Dealers Inquiries Invited.

ROTA FILE CORP.

1328 58th STREET
BROOKLYN 19, N. Y.


Circle 684 on Page 51

MURPHY PISTOL SPRAYER

Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.

Standard of the foundry field for over 50 years. Stocked by leading foundry supply houses. Guaranteed by . . .

2673

JAMCO

JAS. A. MURPHY & CO., INC.

1425 EAST HIGH STREET, HAMILTON, OHIO


Circle 683 on Page 51


for efficient desulphurization at low cost...

Diamond Foundry Grade ASH

Diamond Alkali's dust-free, coarse particle Soda Ash will give you greater efficiency and economy in your desulphurization operations. Diamond's years of experience as one of America's largest producers of soda ash are at your service. Call your nearby Diamond Sales office, or write Diamond Alkali Company, 300 Union Commerce Bldg., Cleveland 14, Ohio.

DIAMOND PRODUCTS FOR THE FOUNDRY

■ MOROC• (Controlled Silicate $CO_2$ binder) —Foundry Grade Ash—Chlorine—Caustic Soda—Solvents.

Diamond Alkali Company, Cleveland 14, Ohio

Sales Offices:

Cincinnati, Ohio
4701 Paddock
REdwood 1-3200

St. Louis 8, Mo.
4246 Forest Park Blvd.
JEfferson 5-2232

Chicago 6, Ill.
20 N. Wacker Dr.
STate 2-9550

Houston 2, Texas
1006 Main St.
FAirfax 3-7329

Cleveland 13, Ohio
633 Penton Bldg.
SUperior 1-8683

Memphis, Tenn.
Box 2088 DeSoto Station
BRoadway 2-1736

Philadelphia 7, Pa.
12 South 12th St.
WAlnut 5-8017

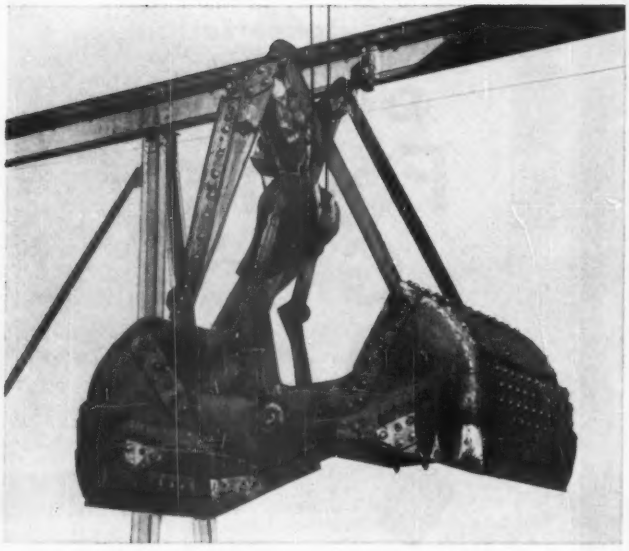
New York 16, N. Y.
99 Park Avenue
OXford 7-0440

Pittsburgh 22, Pa., Oliver Building, GRant 1-7500

Diamond Chemicals


Circle 685 on Page 51

# Blaw-Knox "Shark Tooth" buckets with liner plates for handling both sand and coke



You can cut both your coke and sand handling costs with a dual purpose Blaw-Knox "Shark Tooth" Foundry Bucket.

With liner plates attached you can handle granular fines. Remove the liner plates and the "shark teeth" handle coke with a minimum of degradation.

Your Blaw-Knox Bucket Engineer will be glad to give you full details of this single line hook-on bucket that serves a dual purpose. Call him today.

**WRITE TODAY!** Full details of Blaw-Knox single line hook-on type buckets are contained in Bulletin 2232-R.

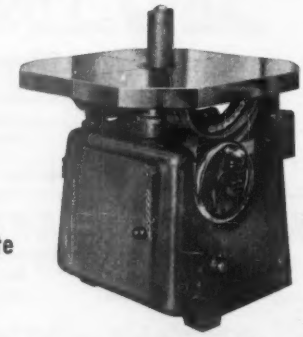
**BLAW-KNOX COMPANY**
*Blaw-Knox Equipment Division*
*Pittsburgh 38, Pennsylvania*

BLAW-KNOX

Circle 686 on Page 51

# OLIVER Oscillating-Tilting Spindle Sander for those hard-to-sand edges of patterns

**A heavy-duty Spindle rotates and oscillates to give you smooth, accurate patterns**



This Oliver sands difficult patterns smoothly, quickly. Its 1-inch spindle rotates at 1800 r.p.m. and oscillates 1⅛" with 56 strokes a minute. Spindle tilts up to 45° toward operator, 5° away from him. Takes drums 2", 4", 6" diameter, 9" long. Spindle has 3" vertical adjustment to provide full use of sanding area. Write for Bulletin No. 381.

*Oliver makes an extensive line of Disk and Spindle Sanders and other woodworking equipment for pattern shops.*

OLIVER SINCE 1890

**OLIVER MACHINERY COMPANY**
**Grand Rapids 2, Michigan**

Circle 687 on Page 51

# COB FLOUR

*greatly increases sand flowability. U. S. standard screen analysis: 40-200. Also* **COB GRITS** *and* **COB MEAL** *for blasting and tumbling.*

**TI-CO INDUSTRIES, INC.** P.O. BOX 185 TIPTON, INDIANA Phone: FEderal 2-5942 Elwood, Ind.

Circle 688 on Page 51

**THE METALLURGY OF STEEL CASTINGS**
By Charles W. Briggs
**625 pages, 334 illus.** **Price $11.00 Postpaid**

A comprehensive work giving detailed data on the chemistry, metallurgy and technology of steel castings. Provides complete information on methods of technical and industrial control in production of steel castings and describes every manufacturing process used.

**FOUNDRY** Book Department 1213 W. 3rd St. Cleveland 13, Ohio

# FOUNDRY

**EDWIN S. CARMAN, INC.**

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

**MODERNIZATION**

Circle 689 on Page 51

# CLASSIFIED ADVERTISING

## Help Wanted

**CORE DEPARTMENT FOREMAN**

For well known, progressive foundry in Up-State New York producing Steel, Gray Iron and Nonferrous castings. Must be capable of supervising 12 men for maximum efficiency and have complete knowledge of rigging equipment for blowing cores and making shell cores. Must be capable of reading blueprints and estimating core production. Must also be well versed in the production of oil sand as well as $CO_2$ cores. Excellent opportunity for right man. Write giving full details of personal background, past experience and salary expected.

**BOX 243, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**FOUNDRY DESIGN ENGINEER**

Large manufacturer in Western Illinois—with a number of gray, nodular, and malleable iron and aluminum foundries in the Middle West—has excellent opportunity for the RIGHT man. He must be experienced in the design of mechanized foundry equipment, sand processing systems, etc., and be able to assume responsibility for development of major installations. Attractive salary, liberal pension, insurance and other benefits. Give detailed resume of experience, age, education, financial requirements, date available and a recent picture in first letter. Reply to:

**BOX 253, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**INDUSTRIAL ENGINEER**

Well established modern, light gray iron foundry located in Chicago area requires graduate industrial engineer to supervise time study methods and standards. Prefer man experienced in departmental budgeting of foundry operations. Excellent opportunity for qualified individual to grow with progressive organization. Submit full particulars regarding personal data, education and experience.

**BOX 275, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**CORE ROOM SUPERVISOR**

Should be young enough to withstand a difficult challenge, and have experience in shell core, oil sand, $CO_2$ and cold set process cores. We are a jobbing shop with a very large core room making a wide variety of cores. Also have opening for supervisor for our squeezer and small rollover molding department. Address: Box 279, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**SUPERINTENDENT**

Good opportunity for capable and energetic steel foundry superintendent for medium-sized steel foundry. Must be aggressive and understand thoroughly steel foundry jobbing operations. Must be cost conscious and capable of getting the most out of his foremen and men. Foundry is located in the middle west. Submit resume. Address: Box 284, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**MOLDING FOREMAN**
**CORE ROOM FOREMAN**

For medium sized semi-mechanized gray iron foundry in Minnesota-Wisconsin area. Must be experienced in modern foundry practices and a capable supervisor fully able to meet department performance standards. Preferred age, 30 to 50 years. Send for application blank. Address: Box 265, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY FOREMAN**

Brass foundry located in small town, Washington, D. C. area, needs experienced foundry foreman. Must be capable of supervising bench, machine, and shell molding, and all foundry operations. Excellent opportunity for right man. Address: Box 280, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOREMEN**

Detroit area Aluminum Foundry running superior quality work interested in good Core Room Coreman, Foundry Foreman and/or General Foreman with proven record in production and discipline. Address: Box 276, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**METALLURGIST**

Young man to assist chief metallurgist of large progressive midwest aluminum foundry with knowledge of sand and permanent mold castings. Excellent opportunity. Submit resume and salary requirements. Address: Box 288, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Help Wanted

**SUPERINTENDENT**

Upper Midwest Jobbing Foundry Approximately 40 years of age Experienced in the production of Gray Iron and Steel Castings. Submit resume and salary requirements.

**BOX 274, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**GRADUATE METALLURGIST**

Five to 10 years' experience. Thorough knowledge production and control high quality iron castings. Familiar with casting defects, cupola, molding and sand control. Would prefer man with Meehanite experience. Send full resume and salary requirements to:

**BOX 269, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**STEEL MELTER**
**ELECTRIC ARC FURNACE**

Foundry producing carbon and alloy steel on West Coast. Give particulars including experience and salary requirements.

**BOX 266, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**LIAISON AND QUALITY CONTROL ENGINEER**

For international manufacturer of mining and construction equipment located in resort area of west central New Hampshire. Under Foundry Superintendent, responsible for liaison with customers and other Joy plants, and for developing and maintaining a quality control program. At least 5 years experience in steel-foundry work with a knowledge of metallurgy, foundry practices and quality control. Requires degree in metallurgy, or in chemistry or physics with metallurgical experience. Send resume and salary requirements to: PERSONNEL MANAGER, JOY MANUFACTURING COMPANY, CLAREMONT, N. H.

**YOUNG FOUNDRY METALLURGIST**

Should have received his degree within the past several years. An excellent opportunity to train under an experienced metallurgist leading to a position of responsibility in operations. Production malleable foundry located in the Midwest. Write giving details of experience, availability, salary, and other requirements. Address: Box 273, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**MANAGER**

Small nonferrous jobbing foundry needs fully qualified man to take charge of all operations. Excellent opportunity and future for right man. Send complete resume with photograph. Strictly confidential. Address: Box 271, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**PLANT METALLURGIST**

Ability to organize and direct stainless steel melting practice, heading, gating, metallurgy. Write in complete confidence. Address: Box 264, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**STEEL FOUNDRY MELTER—METALLURGIST**

Experienced in electric steel basic practice. Position would include direction and supervision of Melt Department and Laboratory. Forward resume of education and experience including salary requirement and availability. Address: Box 249, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**CHIEF MANUFACTURING ENGINEER**

Stainless steel foundry. Must be experienced in industrial engineering, methods engineering and tool engineering. Reporting to vice president manufacturing. Write in complete confidence. Address: Box 263, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY FOREMAN-SUPERINTENDENT**

An Eastern soil pipe manufacturer has an opening for an experienced foundryman. Must be mechanical and a good manager and must have good references. Address: Box 238, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Help Wanted

**FOUNDRY CONSULTANT**

Technical and experienced in glass mold cast gray iron. Preferably available to spend one or two months in Monterrey, Mexico.

**FABRICACION DE MAQUINAS, S.A.**
**APARTADO POSTAL #656**
**MONTERREY, MEXICO**

**METALLURGIST**

Nonferrous metallurgist wanted to work in aluminum foundry. Must be versatile and have well rounded experience. Address: HAMPDEN BRASS & ALUMINUM COMPANY, 262 LIBERTY ST., SPRINGFIELD, MASS.

**ROLLOVER LINE FOREMAN**

Fully mechanized eastern foundry requires foreman to supervise eight station rollover line. Send resume. Address: Box 281, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Positions Wanted

**MANAGER-SUPERINTENDENT**

Practical gray iron foundryman, technically trained, graduate metallurgist with thirty years' broad background of experience producing quality castings in high production and jobbing. Well versed cupola, metal, sand control, modern methods. Desire contact with reliable organization needing services high calibre aggressive foundryman. Results produced at minimum costs. Address: Box 277, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**MALLEABLE CASTINGS SALESMAN**

Graduate Metallurgical Engineer, age 44 with 15 years' experience as malleable foundry superintendent desires position selling malleable castings. Completely familiar with requirements of malleable castings users in Midwest area. An excellent opportunity for a progressive malleable foundry to acquire additional customers. Address: Box 272, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**SUPERINTENDENT OR MANAGER**

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 245, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY MANAGER**

Background of 25 years' work with iron, steel, and nonferrous foundries. Broad experience in supervisory and management capacities relating to production, sales, and labor relations. Mechanical engineering graduate. Address: Box 289, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**SUPERINTENDENT**

Practical and technical, 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 287, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**MANAGER-SUPERINTENDENT**

Ferrous and/or nonferrous, 38 years of age with 12 years of extensive foundry experience. Qualified to handle all phases of foundry operation. Detailed resume on request. Address: Box 234, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRYMAN**

Capable of handling foundry operations, molding, melting, pouring carbon steels, heat and corrosion resist alloys, pure nickel and high alloys. Address: Box 267, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY CONTROLLER**

Fifteen years' experience in ferrous foundries and heavy machinery. All phases of controls, systems, taxes, costs. Address: Box 278, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**CLEANING ROOM FOREMAN**

With 25 years' experience processing castings of all kinds. Free to relocate. Address: Box 252, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# Employment Service

**FOUNDRY PERSONNEL SPECIALISTS**

National Placement and Procurement of

**GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS**

Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact

**DRAKE PERSONNEL, INC.** **HARRISON 7-8600**
**JOHN COPE, DIRECTOR** **220 SOUTH STATE ST., CHICAGO, ILL.**

**SALARIED PERSONNEL**
$5,000-$30,000. This nation-wide service successful since 1927 finds openings in your field. Sells your abilities; arranges contacts. Present position protected. Write for details. Address: JIRA THAYER JENNINGS, P. O. BOX 674, MANCHESTER, VERMONT.

# Positions Wanted

**MANAGER—GENERAL MANAGER**
**NONFERROUS—STEEL—IRON**
Presently employed. Desire position with small or medium-sized foundry operation where expansion and profit program offers challenge. Twenty-five years' supervision and managerial experience. Thoroughly familiar all foundry, core room, cleaning operations. Cost and scrap control a specialty. Versed in modern production methods, $CO_2$, shell, etc. Complete knowledge sands and sand control. Age 47, married, 5 children. University trained. Aggressive. Address: Box 286, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**CORE ROOM OR MOLDING FOREMAN**
**FOREIGN OR DOMESTIC**
Just returned from foreign contract. Expert knowledge in all phases of core blowing, bench and rollover. Experienced in automotive castings, motor blocks, fittings, and jobbing work, large or small. Shell core experience. Will accept consulting work. Ferrous and nonferrous. Address: Box 285, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# Foundry Consultants

**CONSULTING ENGINEER**
**Thirty-five years' Experience**
**Acid and Basic Practice**
Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing and organizing of your melt shop.
**EUGENE H. WEAK** **2933 HIGHWAY AVE, HIGHLAND, IND.** **PHONE: TEMPLE 8-1244**

**HEVERLE & HAY**
**ENGINEERING—ACCOUNTING**
**CONSULTANTS TO INDUSTRY**
(Since 1907)
COST CONTROL—COST REDUCTION
FOUNDRY METHODS
**121 NORTH BROAD STREET**
**PHILADELPHIA, PA.**

**FOUNDRY CONSULTANT—NONFERROUS**
Sand — permanent mold — centrifugal permanent mold—and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, 253—8th STREET, WEST PALM BEACH, FLORIDA. PHONE: TEMPLE 2-8685.

# Representative Available

**MANUFACTURERS' REPRESENTATIVE**
Degree in Metallurgy and ten years experience in foundry industry, desire connection with steel and malleable iron foundry. Presently covering southeastern Pennsylvania, Maryland and Virginia with established aluminum, bronze and gray iron accounts. Address: Box 241, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# Representatives Wanted

**MANUFACTURERS' REPRESENTATIVES**
A leading pressure cast matchplate manufacturer, preparing to introduce new items, is planning to change its sales plan to a local representative organization. Men now calling on pattern shops and foundries are urged to write, listing their qualifications and experience. An unusual chance to get in on the ground floor with an established company now selling from coast to coast. Address: Box 257, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**REPRESENTATIVE WANTED**
Leading foundry supply company, selling both supplies and equipment, requires the services of an energetic sales representative to cover the States of Virginia, North Carolina and South Carolina. Looking for man with foundry experience and sales ability. Good opportunity for the right man. Address: Box 259, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**SALES REPRESENTATIVES**
Exclusive territories available for sale of new shaker tables and screens designed and priced to appeal to small foundries. Other new foundry products to follow soon. Send resume of experience and territory covered. Address: Box 283, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# Opportunity

**PERMANENT MOLD METHOD AVAILABLE THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California,** has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

# Foundries For Sale

**FOUNDRY FOR SALE**
Aluminum sand casting foundry in principal Ohio city. Business, huge inventory of raw material, and real estate, priced under $50,000. Owner has been long established in this lucrative business and wants to retire.
**MEAD REALTY**
**Don W. Mead, Realtor**
**Fremont, Ohio**

**FOUNDRY FOR SALE**
Established Texas Aluminum Jobbing Foundry. Diversified Coverage—Sand, Shell, Permold. Address: Box 290, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# Wanted-To-Buy

**MIXER WANTED**
Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**WANTED**
Mold car conveyor about 200'. State length, car size, make, condition, age and lowest cash price loaded on truck. Address: Box 268, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# Wanted-To-Buy

**FOUNDRY—WANTED—EQUIPMENT**
Foundry investment organization needs used equipment to activate and mechanize a large foundry. Complete foundry with or without property will be considered. Please be specific as to price and when inspection can be made. Principals only. All replies confidential.
**BOX 255, FOUNDRY**
**PENTON BLDG.** **CLEVELAND 13, OHIO**

# For Sale

**SAND BLAST EQUIPMENT**
**SELL-BUY-TRADE**
**GUARANTEED MACHINES**
**TERMS: 3 YEARS TO PAY**

$70,000 worth new Pangborn and Wheelabrator parts. Priced 25% less than list.

| | |
|---|---|
| 6' LF-14 Pangborn Table | $2000.00 |
| 4' LG-14 Pangborn Table | 2200.00 |
| 9' LG-14 Pangborn Table | 4500.00 |
| 6' LG-14 Pangborn Table | 2500.00 |
| Pangborn 8 x 8 Room | 2800.00 |
| Pangborn 55 EN2 Hand cabinet | 325.00 |
| Pangborn Auto Peening cabinet | 1100.00 |
| 48 x 48 Wheelabrator Tum. w/loader | 4000.00 |
| 42 x 48 Wheelabrator Tum. w/loader | 2500.00 |
| 27 x 36 Wheelabrator Tum. w/loader | 3000.00 |
| 8' Wheelabrator Table Blast | 2000.00 |
| 14 LG5 Pangborn Rotoblast Multi-Table 4/5—5' tables | 9000.00 |
| Pressure Tanks, all types | 150.00 up |
| Vapor Blast cabinets | 400.00 |

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

**DIAMOND SALES, INC.**
**5654 W. Jefferson**
**Detroit 9, Michigan**
**VI-3-6750**

**FOR SALE**
#110-J SPO and 275-J OSBORN Portable Jolt Squeeze, only $275.00 each
Model "8" Screenarator, only $247.50
#2-¼ WHITING CUPOLA w/Roots Blower and Skip-Hoist Charger, only $1,095 for all three
Four (4) Molders Hoppers (2 Twin) with Motorized Loader and 14 ft. x 24 inch Flat Reversible (Motorized) Distributing Belt, only $1,795 for all
All in splendid condition and ready to use
**W. O. McMAHON**
**BOX 5943, HOMEWOOD STATION**
**BIRMINGHAM 9, ALABAMA**
**PHONE: TRemont 1-2088**

**FOR SALE**
1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models, 307-10; 310-16 and 502-20.
**R. GELB & SONS, INC.**
**U. S. HIGHWAY 22, RAHWAY VALLEY R.R.**
**UNION, NEW JERSEY**

**FOR SALE**
1—Federal San-Bio Core Blower, Model 40-P8
1—SPO Shell Core Blower—Model SC-20DA
In good condition—less than 3 years old
**JAMESTOWN MALLEABLE IRON CORP.**
**JAMESTOWN, NEW YORK**

**FOR SALE**
Whiting Pulverizer—Size 3
Serial #590 with Type AA Induction 7½ HP motor, 220-440 Volt, 3 phase, 60 cycle, 1755 RPM. Includes piping and spare parts.
**BELCHER MALLEABLE IRON COMPANY**
**EASTON, MASS.**
**Telephone: CEdar 8-2072**

## For Sale

**FOR SALE**

Simpson No. 1 Muller U.D.
Simpson No. 2 Muller
American Tumblast 15 x 20 rubber lined with dust collector
Fisher Furnaces #600 MNP
Fisher Furnaces #400 MNP
Campbell-Hausfeld Tilt Furnaces
Campbell-Hausfeld Stationary Furnaces
Stedman Core Crusher, Hammer Mill
Skip Hoist for 9½ Foot Cupola—complete
Osborn #405 Rollovers
Elevators
Belt Conveyors
Shakeouts
International Rollover RES
Milwaukee 163 Jolt Stripper
Champion JSL 12 Pin Lift, jolt
Osborn 710J, Pin Lift
Osborn 212J, Jolt Squeezers
Osborn 275J, Jolt Squeezers
Osborn 276J, Jolt Squeeze
International LSJ, Jolt Squeeze
International PJS, Jolt Squeeze
Milwaukee 104 Jolt Squeezers
Champion JS 108 Jolt Squeeze
Arcade 100S Jolt Squeeze
Spo 110 Jolt Squeeze
Davenport Rollover 28 SA
International Rollover 30 x 8 portable
International Rollover 2410 G portable
International Rollover 30 x 8 no jolt
Tabor rollover 30 x 40 portable
J & J 610 B rollover portable
International pin lifts
Davenport pin lifts
Osborn 559 pin lifts
Spo 506 jolt rollover, pin lift, draw
International Type R core rollover, hand
Swing Grinders
Royer sand preparators
Simplicity preparators
B & P preparators
Blystone sand mixers
American Sand Cutters, Models M, AM, AA
Coleman core ovens
Porbeck core ovens
Grinders ½ hp to 25 hp
Disc grinders
Ladles from 50 lb. to 10,000 lb.
Pouring Devices 500 lb. to 2000 lb.
Gyratory riddles
Monorail and bridges
Air Hoists 250 lb. to 10,000 lb.
Overhead chain conveyor #458, track, drives.
Blowers-Centrifugal-positive-exhaust
Dust collectors all sizes

**FLASKS**
**ALUMINUM**
**SLIP and POP**
**Sizes from 10" x 10" to 48" x 48"**
**JACKETS**
**Aluminum and Iron**
**STEEL FLASKS**
**Sizes from 10" x 15" to 9' x 9'**
**CORE PLATES**
**Transite —— Iron —— Aluminum**
**MANY OTHER ITEMS IN STOCK**
**SEND US YOUR INQUIRIES**
**WE BUY — SELL — TRADE**

**THE HOMAN MACHINERY CO.**
**710 E. FRONT ST. MAIN 10339**
**CINCINNATI 2, OHIO**

---

**FOR SALE**

1—Dextrex Degreaser with temperature controls, stream pressure regulator, 2 baskets, size 70" x 25" x 12". Purchased 1955, slightly used. Price $1200 total.
1—Rotary Lift Hoist, Model FTL2, purchased 1955, never used. Price $900.
1—PRE2 Ingersoll-Rand Air Compressor, 24 x 12½ x 14 stroke, 210 HP, 440 volt synchronous motor, complete with excitor, Serial No. 40569-40570. Price $6000.
1—Type 10 Ingersoll-Rand Air Compressor, 17 x 10½ x 14 stroke, 150 HP, 440 volt belt driven motor, complete with reduce voltage compensator, Serial No. 36266-36265. Price $5000.
1—Type #25 Size 8000 CFH DX Surface Combustion Gas Generator purchased new in 1956. Price $5600.

**ALBION MALLEABLE IRON COMPANY**
**ALBION, MICHIGAN**

---

**FLASKS AND JACKETS**

Large stock of aluminum slip flasks and pouring jackets in various sizes. Good condition. Must move. Will sell part or entire lot.

Write or Call:

**TAYLOR & BOGGIS FOUNDRY COMPANY**
**1261 BABBITT ROAD**
**EUCLID, OHIO**
**MR. HANKS**
**RE 1-2400**

## For Sale

**FOR SALE**

**SURPLUS FOUNDRY EQUIPMENT**

Located Burt Foundry Division of Electric Auto Lite Co.

Dust Collector System
Sly Sand Blast Unit
Production Core Oven
Air Compressor
15,000 lb. Toledo Scale
Ten Ton Overhead Crane
Bell Chargers, Sand Mixer, Snagging Grinder
One Ton Electric Hoists

CONTACT:

**JACK H. RUTH CO., TOLEDO, OHIO**
**CHERRY 3-2196**

**SHERWIN METAL CO., TOLEDO, OHIO**
**JEFFERSON 1-2848**

---

**FOR SALE**
**MOTORS—GENERATORS**
**TRANSFORMERS**
Unused—Rebuilt
WORLD'S LARGEST INVENTORY

**ELECTRIC EQUIPMENT COMPANY**
Phone station Collect GLenwood 3-6783
P. O. Box 51—Rochester 1, New York

---

**FOR SALE**

Spencer-Turbine Cupola Blower, 30 HP, 4500 CFM, 16 oz. pressure. Safety Swing Grinder, 7½ HP, 20" wheel.

**CONWAY FOUNDRY COMPANY**
**7937 WEST LAFAYETTE**
**DETROIT 9, MICHIGAN**

---

**FOR SALE**
**QUALITY USED EQUIPMENT**

Crucible furnaces, conveyors, cupola, air compressors, dust collectors, pneumatic tools and, many other items. Send us your inquiries.

**SOMIL EQUIPMENT & SUPPLY CO.**
**620½ MARQUETTE AVENUE**
**SOUTH MILWAUKEE, WISCONSIN**
**PHONE: SO 2-3880**

---

**FOR SALE**

1—Lancaster Mixer, Model EBG-4
1—Lancaster Mixer, Model EAG-3
1—Ingersoll-Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor
3—Link-Belt Roto-Louver Rotary Dryers, Models 307-10, 310-16, 502-20.

**R. GELB & SONS, INC.**
**U. S. HIGHWAY NO. 22**
**UNION, NEW JERSEY**

---

**FOR SALE**
Polishing

1—Used Hi-Lite Polishing Machine, Model RRS, Serial No. 91455
1—Used Hi-Lite Polishing Machine, Model RCR, Serial No. 72555

**HOFFMAN PRODUCTS CORP.**
**HOFFMAN, ILLINOIS**

---

**FOR SALE**
#1 SIMPSON MULLER
PORTABLE—LATE MODEL
#276 Osborn Jolt Squeezers
FOR THE BEST DEAL CALL

**BALCHER MACHINERY COMPANY**
**695 E. 152ND STREET**
**CLEVELAND 10, OHIO**
**TELEPHONE: GLenville 1-2474**

---

**FOR SALE**

2—Sand Blast Cabinet Units, with elevators, blowers, blasts, etc., cabinets 16' x 12' x 6½'.
1—Rotoblast Pangborn, 4-position, 2-wheel, with elevator, auxiliary sand blast unit, bin, etc.

All above equipment a fraction of the original cost.

**GENERAL MACHINERY & EQUIPMENT CO., INC.**
**809 WOODLAND AVENUE**
**KANSAS CITY 6, MISSOURI**

---

**PIN LIFTS**

TWO FOR 60" x 70" FLASKS, 5,000 LBS. CAPACITY, 6" MINIMUM DRAW. ADDRESS: BOX 282, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.


# BIG MOLDING MACHINES

●

2—SPO 2302 AUTOMATIS's NEW 1955; 30" squeeze cylinder, 12¼" draw; flask width 22¼" to 37½"; max. length 72"; 57000# squeeze pressure at 80#.

●

8—MILWAUKEE 2646's—NEW 1952 26" squeeze cylinder 13" draw; Flask width 25½" to 29" up to 52" length.

●

2—SPO 2222; 22" Jolt, squeeze, pin lift, squeeze cylinder; 36" x 58" table; 12" draw; 28,000# squeeze pressure.

●

2—MILWAUKEE 244-13 Jolt Squeeze Strippers

●

2—MILWAUKEE 214-28C Jolt Squeeze Strippers

**ANY OF THESE MACHINES CAN BE PURCHASED FACTORY REBUILT**

**ACME EQUIPMENT CO., INC.**
**126 South Clinton Street**
**Chicago 6, Illinois**
**Phone Andover 3-3430**


*Circle 901 on Page 51*

# ANOTHER BIG ACME LIQUIDATION

## HOOSIER IRON WORKS FOUNDRY

KOKOMO, INDIANA

**OVER $750,000 SPENT ON EQUIPMENT SINCE 1953**

**BUILDING SOLD · EQUIPMENT MUST BE MOVED—NOW!**

Aerators
Air Compressor
40′ bucket elevator
½ and 1 yard clam shell buckets
Core assembly conveyor
Flask conveyors
Flat belt conveyors
100 Car 36″ x 54″ car mold conveyor
3—LINK BELT 36″ PA Oscillating Conveyors 20′, 30′ & 35′
Spill sand conveyors
Trough conveyors
CORE BLOWERS — DEMMLER 4EO, 3EO, 2EO, #2, 2K, 2C, 3C, #55 CHAMPION CB15, CB18 REDFORD #2, #1
CORE GRINDERS — Milwaukee and Stoney
Core Buggies
CORE OVENS — Mahler 4 compartment
CORE PLATES
CORE ROLLOVERS—B&P CR20-10, Rol-A-Cor, Sutter SP500F
CRANES 10 Ton Milwaukee 48′-6″ span
INSLEY CRAWLER
FLASKS—Hines and Sterling
ANNEALING FURNACES
72″ Gardner Grinder
Air and electric hoists.
Laboratory equipment
—Ladles
2-SPO 2302 Automatic Jolt Squeeze Strip Rollon, Rolloff—30″ squeeze cyl., New 1955
MULLERS—SIMPSON #3 and #2 (3) Blystone's
Sand Bins
Belts
"RIPL FLOW" Screens
SHAKEOUTS—Simplicity 4′ x 10′ Link Belt 4′ x 6′
TUMBLING MILLS (6) 48″ x 72″, (2) 36″ x 72″
WHEELABRATORS (2) 48″ x 42″

**PLEASE ADDRESS ALL INQUIRIES TO LIQUIDATION OFFICE**
**P.O. BOX 492 · PHONE GLADSTONE 9-4239 · KOKOMO, INDIANA**

MAIN OFFICE

## ACME EQUIPMENT CO., INC.

**126 South Clinton Street · Chicago 6, Illinois · Phone ANdover 3-3430**


*Circle 902 on Page 51*

# CLASSIFIED ADVERTISING RATES

*(Effective July 1, 1956)*

**POSITION WANTED**—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

**ALL OTHERS** — "Help Wanted" — "For Sale" — "Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

**NOTE**—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

**INCH RATES PER INSERTION**

| Single Column 2¼″ Wide | One Time | Three Times | Six Times | Nine Times | Twelve Times |
|---|---|---|---|---|---|
| 1 inch | $ 22.20 | $ 21.00 | $ 19.80 | $ 19.20 | $ 18.60 |
| 2 inches | 43.20 | 40.80 | 38.40 | 37.20 | 36.00 |
| 3 inches | 63.00 | 59.40 | 55.80 | 54.00 | 52.20 |
| 4 inches | 81.60 | 76.80 | 72.00 | 69.60 | 67.20 |
| 5 inches | 99.00 | 93.00 | 87.00 | 84.00 | 81.00 |
| 6 inches | 115.20 | 108.00 | 100.80 | 97.20 | 93.60 |
| 7 inches | 130.20 | 121.80 | 113.40 | 109.20 | 105.00 |
| 8 inches | 144.00 | 134.40 | 124.80 | 120.00 | 115.20 |
| 9 inches | 156.60 | 145.80 | 135.00 | 129.60 | 124.20 |
| 10 inches (1 col.) | 168.00 | 156.00 | 144.00 | 138.00 | 132.00 |
| 15 inches (½ page) | 243.00 | 225.00 | 207.00 | 198.00 | 189.00 |
| 20 inches (2 cols.) | 312.00 | 288.00 | 264.00 | 252.00 | 240.00 |
| 30 inches (full page) | 450.00 | 414.00 | 378.00 | 360.00 | 342.00 |

*Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.*

*Classified Forms Close the 13th of Month Preceding Issue*

## FOUNDRY

**PENTON BUILDING • CLEVELAND 13, OHIO**

# THE ACME BARGAIN PAGE

### BELTING
29" x 180' 24" x 152'
24" x 263' 24" x 120'

### BLOWERS
INGERSOLL-RAND 10,000 cfm., 32 oz., 150 hp., 220 V.
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
GE Centrifugal 6200 cfm., 24 oz., 58 hp. motor
INGERSOLL-RAND 4000 cfm., 60 oz., 100/25 hp., 220-440 V.
NORTH AMERICAN 1050 cfm, 16 oz.
SPENCER 7350 cfm, 16 oz., 50 hp.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V
SPENCER 5500 CFM 32 oz., 220 V.

### CONVEYOR OVERHEAD CHAIN
1700' JERVIS B WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

### CONVEYOR
36" x 162' LINK-BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK-BELT Oscillating Pan
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.
18" x 10' Steel Apron Conveyor w/drives, 3 hp., 220-440 V.
16" x 120' Rubber Belt w/drives

### CORE BLOWERS
DEMMLER #2, 20# cores
DEMMLER #2K, 20# cores
REDFORD #2 up to 5# cores
REDFORD Bench types, horizontal or vertical clamping
2—CB15 55# cores, Universal blow plate
C.B. 10 up to 12# cores, 4½" draw
DEMMLER #4 up to 250# cores
FEDERAL "SAN-BLO" CB 40
INTERNATIONAL SB15H, up to 150# cores, Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
6—OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores

### CORE GRINDERS
7—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

### CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

### CORE PASTE OVENS
COLEMAN 28' Horizontal

### CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

### CRANES
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports

### CUPOLA GUNS
2—BONDACTOR #1250
BONDACTOR #1000

### DUST COLLECTOR
PARSONS 40,000 cfm. cloth bag type

### ELECTRIC MELTING FURNACES
SWINDELL 9' Dia. Top Charge cap. 3 ton steel 5 ton iron per hour, 3500 KVA 13800 volt transformer, complete in place
LECTROMELT 500#, Size T, 300-375 KVA 2300 V primary, Moore controls, G.E. circuit breaker

### ELECTRIC MELTING FURNACES
SINGLE PHASE
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# & 350# Tapered Shell 2300 V.
2—DETROIT "LFC" 350# Tapered shell 7200 V.

### FURNACE TRANSFORMERS
1—"LECTROMELT" 800 KVA, 12000 V., 3 phase
1—WESTINGHOUSE 500 KVA, 11200 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 13800 V., 3 phase

### FURNACES NONFERROUS
CAMPBELL HAUSFELD Stady, pot type
1—HEVI-DUTY HD-181-S Pot type, Electric
2—400# FISHER Gas Fired Tilting Furnaces
4—600# FISHER Gas Fired Tilting Furnaces
1—600# FISHER Gas Fired Stationary Furnace
FISHER RB100 Gas Fired Crucible
3—CAMPBELL HAUSFELD Gas Fired 625# brass hand tilt
1000# STROMAN DC double dipout w/complete controls

### GRINDERS, SNAG
FOX 24" x 2" Single Wheel 10 hp.
2—HAMMOND 20" DE 10WR1 10 hp., 220-440 V.
1—HAMMOND 20" DE Porter Cable backstands 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
HAMMOND WR-2, 2 speed, 30" x 3" wheel

### GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ hp.

### GRINDERS, MISC.
PORTER CABLE BG8 Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel

### HEAT TREATING FURNACES
HOLDEN #202 Electrode Type, Bright hardening annealing 1850°
DESPATCH DT36 Pit type 42" x 40" Electric
LINDBERG 48" x 48" x 72" Elec., 1250°, box type.

### HOISTS
10 ton SHAW BOX electric hoist
4—INGERSOLL-RAND Air trolleys
1—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

### LADLES
1—6000# Industrial Enclosed Gear Crane
3—2125# Industrial Enclosed Geared Crane

### LADLE MIXING
4000# Industrial, Insulated

### MOLD BLOWER
TACCONE TD4 24" x 32" flask

### MOLDING MACHINES
### JOLT SQUEEZE PIN LIFT
3—#165-6B MILWAUKEE TABLE, 24" x 30"
2—#125-3 MILWAUKEE TABLE, 21" x 27"—12" cyl.
2—OSBORN 712 PJ, 18" x 21" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
2—#2114 G. SPO TABLE, 26" x 27"—11" cyl.

### SPECIAL! FACTORY REBUILDING
8—MILWAUKEE 2646 Jolt Squeeze Strip rolloff — rolling molding machines 10" jolt cylinder; 1800# capacity, 26" Squeeze cylinder; 13" draw, Flask size 25½" to 29" wide, 52" long. New 1951. WILL BE FACTORY REBUILT.

### JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ

### JOLT ROLLOVER DRAWS
DAVENPORT 28A, 1500#, 29" x 40" table
1020 JOHNSTON & JENNINGS, 60" x 50" table
JOHNSTON & JENNINGS 918, 44" x 64" table, 20" draw, rollout table
1—1500# HERMAN 26" x 48"
2—750# HERMAN 20" x 30" table
2—INTERNATIONAL RJ 20" x 12"
3—SPO 9032

### JOLT PIN LIFTS
2—INTERNATIONAL 1200-8 28" x 27" table, 8" draw

### PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

### MULLERS and MIXERS
2—#1 SIMPSON Mullers

### SAND CUTTERS
1—ROYER MCZ-43

### SAND SLINGERS
1—B&P Tractor, 19" heads
B&P 2 speed 40/25 hp. double belt
B&P sand slinger head w/Syntron feeder and hopper
2—NEWAYGO super Handy Sandy sand handling systems. Like new

### SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.

### SAWS, CUTOFF
DELTA Abrasive cutoff

### SCALE
FAIRBANKS PRINTOMATIC 6250#

### SCREENS
3' x 8' SIMPLICITY

### SHAKEOUTS
3' x 5' ROBBINS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
4' x 10' SIMPLICITY

### SHOT BLAST
SLY #4, 20" x 20" w/dust collector

### SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #85 TON

### TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
BALDWIN SOUTHWARK 20,000 Tensile Tester w/load indicator and recorder
TYLER ROTAP Testing Sieve w/screens

### TUMBLING BARRELS
2—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.

### WHEELABRATORS
2—42" x 48" AMERICAN Skip Loaders
1—27" x 36" AMERICAN Skip Loader
AMERICAN 27" x 36" Rubber Belt w/loader
AMERICAN Tablast 6-24" tables
AMERICAN Tablast 8-28" tables, late

### WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc
OLIVER 72DR Router or borer
BOICE CRANE 12" Planer
NORTHFIELD #4 Tilting Arbor Saw
TANNEWITZ 30 & 42" Band Saws

EKSTROM CARLSON #540 Universal Router Mill Drill

### WIRE STRAIGHTENERS
AMERICAN type H rod ⅜"-⅝" cap.
2—#2A CLIMAX ¼"

ACME

**ACME EQUIPMENT CO., INC.**

*We will buy for cash a single piece of equipment or your entire plant*

**125 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois**

MONA

# AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

## AIR COMPRESSORS

1—GARDNER DENVER ADR 6¼ x 3½ air cooled, 15 HP.
1—AMERICAN Size 9 x 9, horizontal w/30 hp motor
1—KELLOG Model 350TV—5½ x 5", air cooled, 10 HP.

## AIR & ELECTRIC HOISTS

85—I & R Air Motor type, sizes LC3, A, B, C, D, D-6 & E, 300, ½, 1, 2, 3 & 5 ton.
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
1—SHAW BOX 2 ton load lifter.
2—YALE ½ ton.

## BUCKET ELEVATORS

12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc. 10 x 7, 12 x 7, 14 x 7 16 x 8 buckets

## CUT-OFF MACHINES

2—AMERICAN H-Rod Straighteners.
1—TABOR C10AF, 16" wheel, 10 HP.
3—TESSEMER H & I Sprue Cutters.

## CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—MILWAUKEE #3A, Bench Type.
1—SAN-BLO Model CB-40-B, 40# Cores.
1—SAN-BLO Model 40P-1, w/pulsator.
1—SPO Model SC-10-DM, hollow core.

## CORE OVENS

1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.
1—YOUNG BROS. 6' x 6' x 9' double door, rack type, gas fired.

## CUPOLAS, BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
1—ROOTS CONNERSVILLE Type RCS Size 20 x 60 w/75 HP motor.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1205-L.
1—WHITING No. 6 Cupola.

## ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

## ELECTRIC MELTING FURNACES

1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
1—DETROIT Size CM — 4000# Cold Charge, 8000# Molten Metal, w/1000 KVA transformer.

## GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilting. Sizes 150, 400, 600, 1000, 1700, 2000 & 2400#, aluminum capacities. Gas or Oil Fired.
29—LINDBERG & HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—LINDBERG #400 BBI hand tilt
1—LINDBERG #300, ATH, hand tilt.
1—STROMAN, Model "U," 600# Reverberatory Hand Tilt.

## HEAT TREAT FURNACES

2—L & N No. G578UB48-10, Nitrading-Electric.
2—LINDBERG 2236EH pit type, 22" D x 36" H, elec.
1—LINDBERG 3360G17 pit type, 33" D x 60" H, gas
1—L & N "Homo" 14" D x 16" H, elec.
1—SURFACE COMBUSTION, box 8' W x 10' L x 9' H.

## HOUGH PAYLOADER

Model HA, 18 cu. ft. bucket, hydraulic, w/Notat Tires, New 1955.

## GRINDERS

**Swing Frame**

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

**Snagging**

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.
3—U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed

**Core**

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder. 16" dia. Wheel.

**Horizontal Disc**

GARDNER No. 124—53" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

## LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles, 2 & 3 ton capacities. Electric & Manual Tilting.

## MOLDING MACHINES

**Jolt Squeezers**

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

**Plain Jolt**

1—J&J 50 x 72 Table—5000# cap.

**Jolt Rollover Pattern Draw**

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—DAVENPORT #24SA, 24" x 40" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Sizes 20" x 8", 24" x 10".
2—J&J #612, 24" x 30" Table.
4—J&J #918, 44" x 54" Table.
1—J&J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 508, table size 28" x 30".
1—SPO 506—24" x 30" Table 10" Draw.
2—SPO 9546, 26" x 32" table.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

**Jolt Pin Lift**

3—INTERNATIONAL JDP 1600 X 10" draw, 36" x 36" Table.
2—J & J No. 68S, 25 x 30 Table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—TABOR, 22" x 32" table

**Pin Lift**

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs, up to 30" x 40" flasks.

**Jolt Squeeze Pin Lift**

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE No. 165, 24" x 30" table, 16" sq. cyl.
3—MILWAUKEE #196, 17" x 38" Table, 19" cyl.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORNS 714PJ, 20" x 31" Tables.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL PK-20, Size 20" x 8".
2—SPO 2192-R, 24" x 40" table, 19" cyl.

## CONVEYORS

**Steel Apron**

9—JEFFREY & LINK-BELT 24", 30", 36", widths. Lengths built to your specifications, with reducers & motors.

**Oscillating & Vibrating**

1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.

LINK-BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan
1—12" W x 21' L x 4" deep pan
1—12" W x 26' L x 4" deep pan
1—18" W x 18' L x 4" deep pan

**Roller**

2500' MATHEWS 6", 12", 18" & 20" wide, 2 7/16" dia. roller, 1 1/4" hex shaft, 4" channel.
1500—MATHEWS 12" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

**Mold**

3—LINK-BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

**Belt**

LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

## MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

## ROTO-LIFT

1—OSBORN No. 3161-12, New 1955

## SAND MULLERS

1—B & P #40, Speed Muller, 6 cu ft.
1—B & P #60, Speed Muller, 12 cu ft.
2—B & P #70, Speed Mullers, 18 cu ft.
1—BESSER Paddle Type, 30 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders. 10 to 14 cu ft batch.
1—CLEARFIELD #404, 4 cu. ft. batch
1—DRAVO-DOYLE 6 cu ft cap, Port.
1—LINK-BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON No. 1H Style UD—500#.
1—SIMPSON #1½, Style UD, 700 lb. w/loader.
2—SIMPSON #2, Style UD, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.

## SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP, NRS.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
1—MOULDERS' FRIEND 60" Brush.

## SANDSLINGERS

1—B & P Motive Speedslinger
1—B & P Motive Jr., 300 cu ft tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.
6—B & P Tanks for speed slingers.

## SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B
1—SIMPLICITY 4' x 8' Model D
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
2—ROBBINS 3' x 5' JF6—2000#.
1—ROBBINS 4' x 6' JF9—8000#.
1—ROBBINS 4' x 8' JF9—10,000#.
1—ROBBINS 6' x 10' JF11—20,000#.

## SAND BLAST EQUIPMENT

1—AMERICAN 20" x 27" w/dust collector.
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7-14" tables.
2—AMERICAN 36" Continuous Tumblasts.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53 type EN-2 blast cabinet with dust collector.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN 6LG-14 Multi-Table w/dust collector.

## TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 30" x 48", 24" x 48", 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

# AAA MACHINERY & EQUIPMENT CO.

10900 CEDAR ROAD—CLEVELAND 6, OHIO—CALL SW 1-3900

# UNIVERSAL

REBUILT EQUIPMENT GUARANTEED

## AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

## BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure & Cent. Cupola Blowers

## CLEANING EQUIPMENT & TUMBLING BARRELS

1—15" x 20" AMERICAN WHEELABRATOR, Rubber Belt
1—27" x 36" AMERICAN WHEELABRATOR TUMBLAST
1—36" x 42" AMERICAN WHEELABRATOR TUMBLAST
1—48" x 42" AMERICAN WHEELABRATOR TUMBLAST, w/loader
1—36" Continuous AMERICAN WHEELABRATOR, side discharge, two heads, Serial #A95643. New 1953. Used 2 months
1—#1-A Multitable AMERICAN WHEELABRATOR, 6-26" tables, New in 1954, w/dust col.
1—PANGBORN TABLAST, 8' Table, 2500#
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round
4—SLY, 48" x 36" Round

## CONVEYORS

1—JEFFREY, 3 compartment, ingot mold
1—LINK-BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK-BELT, 30" Steel Apron Conveyors, 100' Centers
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
1—SIMPLICITY, 24" x 10" Feeder w/hopper, Model OA-10-JA2
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES
200 ft. WESTOVER Track w/100 Aluminum Pallets 31" x 19"

## CORE BLOWERS

10—DEMMLER #1, #2, #2A, #3K, #4E
3—INTERNATIONAL 8B-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A," Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

## CUPOLAS

1—SKIP CHARGER for #9 Cupola with scale and buckets
1—WHITING Skip Charger for #5 Cupola
2—WHITING #7, 7 ton cap. Never used. Fraction of cost!

## DUST COLLECTORS

1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

## FURNACES—DIRECT ARC MELTING

1—250 Lb LECTROMELT, Side Charge
1—500# LECTROMELT
1—3000 #/hr LECTROMELT
1—3000# HEROULT
1—3 Ton LECTROMELT, Door Change
1—3 Ton SWINDELL Hyd. Top Charge, 3000 KVA Transformer, Latest Type

## FURNACES—INDIRECT ARC

1—10# DETROIT
1—60# DETROIT
1—350# DETROIT LFA
1—750# DETROIT LFY, Conical Shell
1—1000# DETROIT AA, 300 KVA
1—3000# DETROIT C, 500 KVA

## FURNACES—INDUCTION MELTING

1—100 KW AJAX, Steel, Very Late
1—175 KVA AJAX, Brass
1—3 KW, AJAX, Lab type, steel
1—35 KVA, AJAX SPARK GAP, High Freq., steel
1—333 KW, AJAX, 1000# steel

### 9' Swindell Arc Furnace

HYDRAULIC TOP CHARGE—COMPLETE

Because we must soon move this furnace, we are prepared to sacrifice it for Immediate Sale. If we dismantle and move this 6 ton furnace into our warehouse, we will not be able to ever offer you such an excellent furnace at this Very Low Price. Complete set of prints, engineering service available.

## FURNACES—GAS & OIL

1—FISHER MNP, Gas Tilting, 1700#
1—400# FISHER MNP, Gas Fired
1—400# FISHER, Oil, Stationary
1—250# FISHER, Oil, Tilting
3—Stationary, Gas, 250# to 1000#
1—REDA, 1000# capacity
1—HAUSFELD, Tilting, 1200# capacity
1—STROMAN, Gas, 1000# cap. Alum., auto control hyd. tilt.
1—STROMAN, Gas, 600 lb, "U" Type

## FURNACES—HEAT TREAT

1—2' x 3' x 6' gas fired, 1800° F.
1—4' x 4' x 10' Gas Fired Annealing
1—20" x 36" L&N Draw electric
1—32" x 78" L&N Vapocarb, 83 KW

## MOLDING MACHINES

**Jolt Rollover Pattern Draw**

3—J & J #1020, 50" x 60" Table, 3000#
1—J & J #918, 44" x 54" Table, 18" draw
1—J & J #815RB, 30" x 40" table, 1200#
2—HERMAN 10,000#, 48" x 109" tables
1—HERMAN 6000#, 42" x 78"
1—HERMAN 3000#, 30" x 66" table
5—HERMAN 1500# to 30" x 48" tables
3—HERMAN 750# to 30" x 36" tables
2—INTERNATIONAL, 13" x 17" tables
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 57", 26" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
2—TABOR 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable, 600#
1—TABOR 20" x 30" w/air clamps, 1000#
2—TABOR 14" x 16" Rockover, 150#

**Plain Jolt**

2—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200# to 1800#

**Jolt Pin Lift**

1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
2—SPO #305, 750 lb
1—TABOR 17" x 20" table, portable
1—TABOR 20" x 24" table, 600#

**Jolt Squeeze Pin Lift**

2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq., 5½" draw, stat.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#, 8" draw
2—MILWAUKEE #163, 15" x 24" table, 11" sq., 1500#
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
1—OSBORN #716 PJ, 22" x 34" table, 1250#, 7" draw, stat.
5—SPO #2114P, 21" x 27" table, 600#
5—SPO #2136G, 21" x 30" table, 800#

**Jolt Squeezers**

4—INTERNATIONAL #10 LJS, 17" x 20"
1—MILWAUKEE #104-5, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600#
31—OSBORN #275PJ, #275J, 17" x 20" tables, 10" sq., 400#, stat. & port.
3—OSBORN #276J, 17" x 26" table, 13" squeeze, 500# port.
2—SPO #110J, 17" x 20" table, port.
8—TABOR, 18" x 20" Table

## MATERIALS HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 3,000 lb, capacity, Solid Tire
1—HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

## MULLERS AND MIXERS

1—B & P #3½ Muibaro, 3½ cu. ft. batch
1—B & P #30 Speedmullor, 3 cu ft batch
1—B & P #70 Speedmullor, 15 cu ft batch with cooling and skip loader
1—B & P, Conventional, SIMPSON type, 87½" Dia. arranged for cooling
1—CLEARFIELD #404, 4' Dia, 4 cu ft batch
1—CLEARFIELD #610, 6' Dia., 10 to 14 cu ft batch, w/loader
5—SIMPSON #0, U.D. 3' Dia, never used
1—SIMPSON #1, U.D., 4' dia., 4 cu. ft. batch
1—SIMPSON #2, 6' U.D. Dia. 14 cu ft batch
1—SIMPSON #3, 8' Dia. Unit Drive, with loader 20-25 cu ft batch
1—SIMPSON #3, 8' Dia. Open Gear, 20-25 cu. ft. batch

## LADLES AND POURING DEVICES

**Bottom Pour**

2—MODERN Crane Type, 55" H x 50" top
1—MODERN Crane Type, 60" H x 60" top

**Lip Pour**

1—WHITING 40" x 40" top dia. geared

**Cylindrical**

8—WHITING, 26" L x 25" dia., 1100# iron
7—WHITING 19" L x 22" dia, 600# iron
3—WHITING, 38" L x 28" dia, 2200# iron

**Pouring Devices**

11—WHITING, 650# to 2000# gross cap.

## OVENS

1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22" x 12' x 10'
2—GENRICH, Elec., 3 drawer, preheating, auto-control, 9' H & 8' W x 6'7" L
1—KOCHS BROS. Electric, 36" x 40" x 64" inside
1—PORBECK, oil, 5 drawer core oven
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

## SAND CONDITIONING

2—B & P Screenarator, Model "S" & "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP motor
1—ROYER, NC-4, 10-15 tons/hr, 1½ HP motor
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 8' x 8' hopper
1—ROYER, NDP 15-25 ton/hr, 2 HP

## SAND CUTTERS

1—AMERICAN, 15 HP, 96/78 Reel
1—AMERICAN, 10 HP, 48" Reel
1—B & P Nite-Gang

## SAND SLINGERS

1—B&P Stationary, Single Speed, plate feeder
1—B&P Tractor Type, 19" head
1—B&P Tractor Type, 16" head

## SHAKEOUTS AND SCREENS

1—SIMPLICITY Vibrex screen, 3' x 8'
1—ROBINS Vibrating Screen, 36" x 78"
1—SIMPLICITY 50" x 116" shakeout

## MISCELLANEOUS

1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
FLASKS, CORE PLATES, All Sizes
500,000# Hyd. Compression Testing Machine
4" FOOTBURT Horiz. Bar Mill
5 Ton WELLMAN Charging Machine
1—TABOR Cut-Off Saw, 7½ HP motor
1—CLIMAX Model 2-A Wire Straightener
10 or 15 HP GRINDERS, Swing Frame
8—GRINDERS, Double End, Pedestal Type, U. S., Cinn., Gardner, 5, 7½ & 10 HP

UNIVERSAL MACHINERY AND EQUIPMENT CO.

**1632 N. Ninth St., Reading, Pa.** **Phone: FRanklin 3-5103**

***Send for Our FREE Catalog***

# Now Liquidating

**Oliver Corporation's Gray Iron and Malleable Foundries at 533 S. Chapin St., South Bend, Indiana. LATE TYPE Foundry Equipment.**

**FOUNDRY**

8—MULLERS, 5—B&P #80; 1—B&P #60; 2—B&P #40's with skips.

8—MOLDERS HOPPER LINES—150 Hoppers.

10—"NO LEAK" Steel Slat Conveyors.

3—MOLD CONVEYORS.

20—Belt Conveyors, Trough and Flat Belt, some have magnetic pulleys.

6—Revivifiers and Sand Screens.

7—Overhead Sand Bins 1000 to 4000 cu. ft.

11—Shakeouts: Robbins, Simplicity, Link-Belt.

5—Oscillating Pan Conveyors.

6—Bucket Elevators 41 to 60 feet.

B&P Slinger, Turntable, Plate Feeder.

135—MOLDING MACHINES, JOLT SQUEEZE PIN LIFTS: SPO 2222, 2160, 2148, 2136, 214, 113J, and 110J; OSBORN 276J and 275J, ROLLOVERS; SPO 507, and 506; JOLT SQUEEZE ROLLOVER DRAW 413D, PIN PUSH-OFFS B&P AL2428.

7000' Roller Conveyor 12" to 26".

**CLEANING ROOM**

American Shot Blast, 2-48" x 48"; 2-42" x 36"; 4 Whiting geared motor drive tumbling barrels — 6 — HISEY WOLF Grinders, 30" to 18" wheel sizes—Wood Slat casting sorting conveyors.

3—Whiting Hydroclone Dust Suppressors.

5—Rotoclones—Bag type Dust Collectors.

**CORE ROOMS**

Core Blowers: 3—Demmler 2K, 2 Demmler #2; 4 Demmler #1; 1—Demmler #50; 2—International 8B13; 9—Redford Bench type Rollovers; 1—Spo 507; 2—Spo 506; 1—International R.E.D.P. 6—Hand Rollovers. Coleman Car type and Young Brothers continuous core ovens, core racks, core buggies.

**HEAT TREATING**

4—General Electric 5 Ton Electric Annealing ovens 1750° and 1350°.

**MELTING DEPARTMENT**

Cupola—4 Whiting #7; 1—Whiting #6.

WHITING HYDROARC ELECTRIC DUPLEXING FURNACE, 4130# cold charge, 4160 volt, 1100 KVA.

2—Whiting Air Furnaces, 2—30A Coal Pulverizers.

2—Whiting 7½ Ton OET 107' span.

Whiting Tiger Charge Crane—3 Whiting U holding ladles. Overhead scrap storage, charge and weigh hoppers, Canton Shear, 55" Magnet.

3—Whiting Allis Chalmers Cupola blowers. Whiting Slag Disposal Units.—36 Modern Pouring devices, Scales 100# to 12,500#.

**CRANES**

2—Whiting 7½ Ton 108' Span OET Cranes.

30—CLEVELAND Bridge Cranes, 800' 10" arch beam, 2000 feet "T" Rail.

15—CLEVELAND Hot Metal Carriers, 2600'-10" & 12" Arch beam rail.

11—Electric Monorail Hoists 1—5000#.

3 STRAIGHTENING PRESSES: 500 TON H.P.M.; 50 TON and 25 TON OIL GEAR.

AIR COMPRESSOR—300 H.P. Synchronous Chicago Pneumatic.

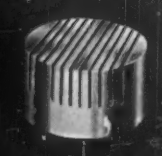
**WRITE • WIRE • PHONE**

## ACME EQUIPMENT CO., INC.

**LIQUIDATION OFFICE: Phone Atlantic 9-9263 533 S. Chapin St. P. O. Box 486 • South Bend, Indiana**
**Chicago Office & Warehouses • 126 S. Clinton St., Chicago 6, Illinois • ANdover 3-3430**

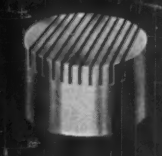
Circle 907 on Page 51

## SLOTTED CORE BOX VENTS



X-TRA DEEP HEAD .156 Wide Slots .014

SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

$CO_2$ TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS. FERNDALE 20, MICH

## INSERTING DRILL

- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

**VENT CLEANER**
- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

Circle 690 on Page 51

**FERRO ALLOYS**
- FERRO CHROME
- FERRO COLUMBIUM
- FERRO MANGANESE
- SILICO MANGANESE
- FERRO SILICON

**MINERALS**
- IRON ORE
- MANGANESE
- CHROME

*Direct Representative Foreign & Domestic Sources*

**H. K. BENNETT & CO.**
342 MADISON AVE.
NEW YORK 17, NEW YORK

Circle 691 on Page 51

## Only from LENNOX industrial heaters

400,000 to 2,000,000 Btuh • VERTICAL OR HORIZONTAL APPLICATIONS

1. 4-PASS COUNTER FLOW!
2. MASTER CONTROL PANEL!
3. STAINLESS STEEL COMBUSTION CHAMBER!
4. DOUBLE CASING WITH METAL RADIATION SHIELD!

*Write for Engineering Data:*

**LENNOX Industries Inc.**

Dept. F-12
1701 East Euclid
Des Moines, Iowa

Circle 692 on Page 51

# Advertising Index


Acheson Colloids Co. ..... 163
Acme Foundry Co. ..... 158
Adams Co., The ..... 190
Ajax Electric Co. ..... 144
Ajax Electrothermic Corporation ..... 144
Ajax Engineering Corporation ..... 144
Allis-Chalmers ..... 117
Aluminium Limited Sales, Inc. ..... 21
American Air Filter Co., Inc. ..... 133
American Optical Co. ..... 181
American Smelting & Refining Co., Federated Metals Division ..... 11
Arcair Co. ..... 167
Archer-Daniels-Midland Co., Federal Foundry Supply Division ..... 4, 5
Atlantic Abrasive Corp. ..... 130

Bay State Abrasive Products Co. .....48, 49
Beardsley & Piper Division, Pettibone Mulliken Corporation .....97, 159
Bellows Co., The, Division of International Basic Economy Corporation ..... 32
Bennett, H. K., & Co. ..... 210
Blaw-Knox Co., Blaw-Knox Equipment Division 202
British Moulding Machine Co., Ltd. ..... 115

C & S Products Co. ..... 6
Carman, Edwin S., Inc. ..... 202
Carver Foundry Products Co. .....16, 179
Cast-Master, Inc. ..... 193
Centrifugal Casting Machine Co. ..... 200
Chicago Pneumatic Tool Co. ..... 44
Chicago Rubber Co., Inc. ..... 213
Cities Service Oil Co. ..... 155
Clearfield Machine Co. ..... 42
Cleveland Flux Co., The ..... 13
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. ..... 149
Crucible Manufacturers' Association ..... 189
Curtiss-Wright Corporation, Princeton Division 22

DeBardeleben Coal Corporation ..... 200
Demmler Manufacturing Co. ..... 29
Denver Fire Clay Co., The ..... 122
Diamond Alkali Co. ..... 201
Durez Plastics Division, Hooker Chemical Corporation ..... 26

Eastern Clay Products Department, International Minerals & Chemical Corporation .....40, 41
Eastman Kodak Co., X-Ray Division ..... 101
Electro Metallurgical Co., Division of Union Carbide Corporation ..... 19

Fanner Manufacturing Co., The .....142, 143
Federated Metals Division, American Smelting & Refining Co. ..... 11
F. E. (North America) Ltd. ..... 150
Foote Mineral Co. .....30, 31
Foundry Design Co. ..... 171
Foundry Educational Foundation ..... 175
Foundry Equipment Co. ..... 53
Foundry Services, Inc. ..... 124

Gates Rubber Co., The ..... 37
General Dynamics Corporation, Liquid Carbonic Division ..... 169
General Electric Co. ..... 113
Globe Steel Abrasive Co., The ..... 57
Goodrich, B. F., Industrial Products Co. .... 8
Gordon, Claud S., Co. ..... 148
Great Lakes Carbon Corporation ..... 47
Great Western Mfg. Co. ..... 213

Hanna Furnace Corporation, The..... 123
Hansberg Shooters, Inc. ..... 20
Hartley Controls Corporation ..... 196
Herman Pneumatic Machine Co. .....14, 15
Hines Flask Co., The .....17, 46
Hooker Chemical Corporation, Durez Plastics Division ..... 26
Hough, Frank G., Co., The ..... 58
Houghton Laboratories, Inc. ..... 177

Illinois Testing Laboratories, Inc. ..... 110
International Automation Corporation ..... 23
International Basic Economy Corporation, The Bellows Co., Division ..... 32
International Minerals & Chemical Corporation, Eastern Clay Products Department ....40, 41
International Nickel Co., Inc., The ..... 1

Jeffrey Manufacturing Co., The ..... 28
Johns-Manville ..... 112
Joy Manufacturing Co. ..... 18

Keokuk Electro-Metals Co. ..... 176
Keystone Abrasive Wheel Co. ..... 7
Knight, Lester B., & Associates, Inc. ..... 104



# FOUNDRY

Penton Building, Cleveland 13, Ohio
Main 1-8260

## BUSINESS STAFF

GEORGE A. POPE
Business Manager

MARY JANE KIMPEL, Advertising Service Mgr.

DAVID D. GIBBS, Market Research Mgr.

S. F. MARINO, Promotion Dir.

J. M. CASTIGLIONE, Production Mgr.

G. R. EBERSOLE, Distribution Mgr.

BETTIE COOK, Circulation Mgr.

DOLORES BUTRICK, Classified Advertising Mgr.

MILDRED CHRISTOPHER, Census Mgr.

JEANNE CORSIGLIA, Staff Asst.

JUNE SCHILENS, Reprint Service

## Branch Offices

New York 17 .....60 East 42nd St.
J. F. AHRENS, J. L. OZANNE
Murray Hill 2-2581

Chicago 11 .....520 N. Michigan Ave.
A. W. JOHANSEN, L. R. HETKE
Whitehall 4-1234

Cleveland 13 .....1213 West Third St.
A. L. KLINGEMAN, E. H. THOMAS
K. L. MOUNTAIN
Main 1-8260

Griffin, Ga. .....1106 Pine Valley Road
F. J. ALLEN
Griffin 7854

Los Angeles 36 .....5943 West Colgate Ave.
F. J. FULLER
Webster 1-6865

San Francisco 4 .....57 Post St.
ROBERT W. WALKER CO.
Sutter 1-5568

Detroit 35 .....15800 West McNichols Rd.
Broadway 3-8150

Pittsburgh 19 .....2837 Koppers Building
Atlantic 1-3211

Washington 4 .....1123 National Press Building
Executive 3-6849

Clearwater, Fla. .....1954 Jeffords Drive
H. G. ROWLAND
(Clearwater) 39-9493

Dallas 35 .....818 Exchange Bank Building
JAMES H. CASH
Fleetwood 1-4523

London .....2 Caxton St., Westminster, S.W. 1
JACK C. G. CRUMP

Published monthly by

THE PENTON PUBLISHING COMPANY

GEORGE O. HAYS .....Chairman
RUSSELL C. JAENKE .....President
FRANK G. STEINEBACH...Vice Pres. and Secretary
FRANK O. RICE .....Vice President
JOSEPH P. LIPKA...Treasurer and Asst. Secretary

Also publisher of STEEL • MACHINE DESIGN
NEW EQUIPMENT DIGEST • AUTOMATION

FOUNDRY is edited primarily for management, production, technical and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve key foundry personnel on an individual or routed basis. A limited number of copies is supplied at no cost to educational institutions.
Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2.

FOUNDRY is indexed regularly by
Engineering Index Inc.
29 West 39th St., New York 18.

Member
Business Publications Audit Inc.
National Business Publications Inc.
Society of Business Magazine Editors
Industrial Advertising Research Institute

BPA NBP

Rexarc
"King of the Arc"
•
The Complete
Hard Facing Line
MANUAL and
AUTOMATIC
•
Write for
Free Brochures
The Sight Feed
GENERATOR COMPANY
WEST ALEXANDRIA, OHIO, U.S.A.

Circle 693 on Page 51

Use an Inquiry Card

For further information on anything described or advertised in this issue . . . . . .

SEE
Page 51

# Advertising Index

Lectromelt Furnace Division, McGraw-Edison Co. ..... 38
Lennox Industries, Inc. ..... 210
Lindberg Engineering Co., Lindberg-Fisher Division ..... 59
Lindberg-Fisher Division, Lindberg Engineering Co. ..... 59
Linde Co., Division of Union Carbide Corporation ..... 161
Link-Belt Co. ..... 195
Liquid Carbonic Division of General Dynamics Corporation ..... 169
Louthan Manufacturing Co., The ..... 188

McGraw-Edison Co., Lectromelt Furnace Division ..... 38

Macklin Co. ..... 173
Magnet Cove Barium Corporation ..... Inside Front Cover
Manhattan Rubber Division, Raybestos-Manhattan, Inc. ..... 147
Mathews Conveyer Co. ..... 160
Maughlin, H. P., Co., The ..... 174
Mayer, Carl Corporation, The ..... 156
Metal Blast, Inc. ..... 99
Midland-Ross Corporation, J. O. Ross Engineering Division ..... 36
Milwaukee Chaplet & Mfg. Co. ..... 138
Modern Equipment Co. ..... 214
Moltrup Steel Products Co. ..... 199
Murphy, James A., & Co., Inc. ..... 201

National Engineering Co... 125, 127, 129, 131
Newaygo Engineering Co. ..... 197
New York & New Jersey Lubricant Co. ..... 188
Nichols Engineering & Research Corporation 157
Nomad Equipment Division, Westover Corporation ..... 185
North American Refractories Co. ..... 182
Norton Co. ..... 121, 187

Ohio Ferro-Alloys Corporation ..... 39
Oliver Machinery Co. ..... 202
Orefraction Minerals, Inc. ..... 102
Osborn Manufacturing Co. ..... 108, 109

Pangborn Corporation ..... 137, 139, 141
Pekay Machine & Engineering Co. ..... 135
Penn Iron Works, Inc. ..... 200
Pettibone Mulliken Corporation, Beardsley & Piper Division ..... 97, 159
Philadelphia Quartz Co. ..... 213
Phillips Conveyor Co. ..... 174
Pickands Mather & Co. ..... 184
Picker X-Ray Co. ..... 43
Pittsburgh Coke & Chemical Co. ..... 27
Porcelain Products, Inc. ..... 10

Raybestos-Manhattan, Inc., Manhattan Rubber Division ..... 147
Reda Pump Co., Furnace Division ..... 167
Redford Iron & Equipment Co. ..... 50
Reichhold Chemicals, Inc. ..... Back Cover
Republic Steel Corporation ..... 24, 25
Ridley & Co., Inc. ..... 199
Ross, J. O., Engineering Division of Midland-Ross Corporation ..... 36
Rota File Corporation ..... 201
Royer Foundry & Machine Co. ..... 183

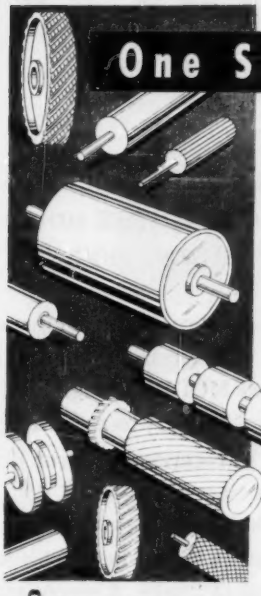
Scientific Cast Products Corporation, The .... 196
Shepard Niles Crane & Hoist Corporation .... 12
Sherritt Gordon Mines Co., Ltd. ..... 30, 31
Sight Feed Generator Co., The ..... 212
Smillie, C. M., & Co. ..... 210
Smith, A. O., Corporation ..... 54, 55
Smith Oil & Refining Co. ..... 45
Standard Conveyor Co. ..... 162
States Engineering Corporation ..... 200
Sterling National Industries, Inc. ..... 60, 122
Stevens, Frederic B., Inc. .... Inside Back Cover

Tabor Manufacturing Co., The, Division of Turbo Machine Co. ..... 56
Thiem Products, Inc. ..... 9
Ti-Co Industries, Inc. ..... 202
Turbo Machine Co., The Tabor Manufacturing Co., Division ..... 56

Union Carbide Corporation, Electro Metallurgical Co., Division ..... 19
Union Carbide Corporation, Linde Co., Division ..... 161
Union Steel Products Co. ..... 178
United States Graphite Co., The ..... 111
United States Rubber, Mechanical Goods Division ..... 93
Universal Clay Products Co. ..... 201

Westover Corporation, Nomad Equipment Division ..... 185
Wheelabrator Corporation ..... 2
Whitehead Brothers Co. ..... 35
Whiting Corporation ..... 106
Woodward Iron Co. ..... 95

Classified Advertising ..... 203, 204, 205, 206, 207, 208, 209, 210



## One Source For

**RUBBER ROLLS and CONTACT WHEELS**

*In sizes and coverings to do your job better at Less Cost*

Rubber Rollers for all industries, including
- Guide Rolls
- Pinch Rolls
- Hold Down Rolls
- Coating Rolls and Segmented Polishing Rolls
- Segmented Rolls
- Highest quality materials and workmanship
- Competitively priced

Abrasive Belt Contact Wheels for Oiling out and finishing aggressive Contour Grinding, Stock Removal, Aggressive Stock Removal, Polishing and Buffing. Specializing in urethane forms and solids.

*Write today for Catalog and prices, or send blueprints for us to quote on.*

CHICAGO RUBBER COMPANY, INC.

664 Market Street • Waukegan, Illinois

Circle 694 on Page 51

reliable source for ALL SILICATE needs

CEMENTS
CLEANERS
COAGULANTS
COATINGS
BINDERS

PQ specializes in soluble silicates. You are sure to get the right one for your use, plus information on how its properties fit into your operations.

Fast deliveries of bulk or carload and truckload in drums are available direct from our plants in Anderson, Indiana; Buffalo, N. Y.; Baltimore, Md.; Chester, Pa.; Jeffersonville, Ind.; Kansas City, Kansas; Rahway, N. J.; St. Louis, Mo.; Utica, Ill.

*When it's silicate service you need, contact PQ.*

**PHILADELPHIA QUARTZ COMPANY**
1062 Public Ledger Building, Philadelphia 6, Pa.

**PQ SOLUBLE SILICATES**

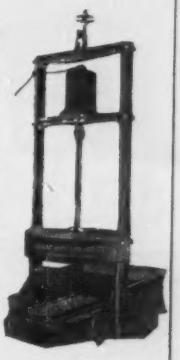
9 PLANTS • DISTRIBUTORS IN OVER 65 CITIES

Circle 695 on Page 51

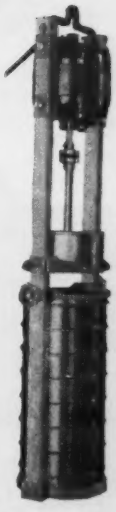
## ACCURATE RESULTS ASSURED with COMBS GYRATORY RIDDLES

*"The Greatest Name in Motion"*

**TYPE "CS".** Complete price $395.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs., ⅓ H.P. enclosed motor.

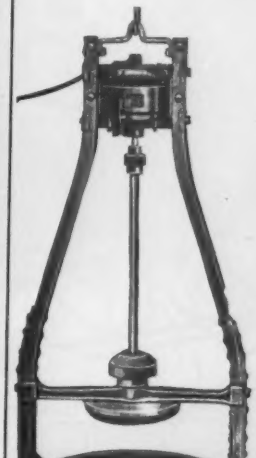


**TYPE "CR".** Complete price $385.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., ⅓ H.P. enclosed motor.



**TYPE "HL".** Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.

**PROMPT DELIVERY from your Foundry Supply House**



**TYPE "V".** Price, 20" Sieve, $300.00. Does the work of 10 men. Screens sand. Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. Height 4'6", weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $545.00.

MAIL THE COUPON NOW!

**GREAT WESTERN MFG. CO.**

Leavenworth, Kansas Phone MU-22291

☐ Send Additional FREE Information

NAME

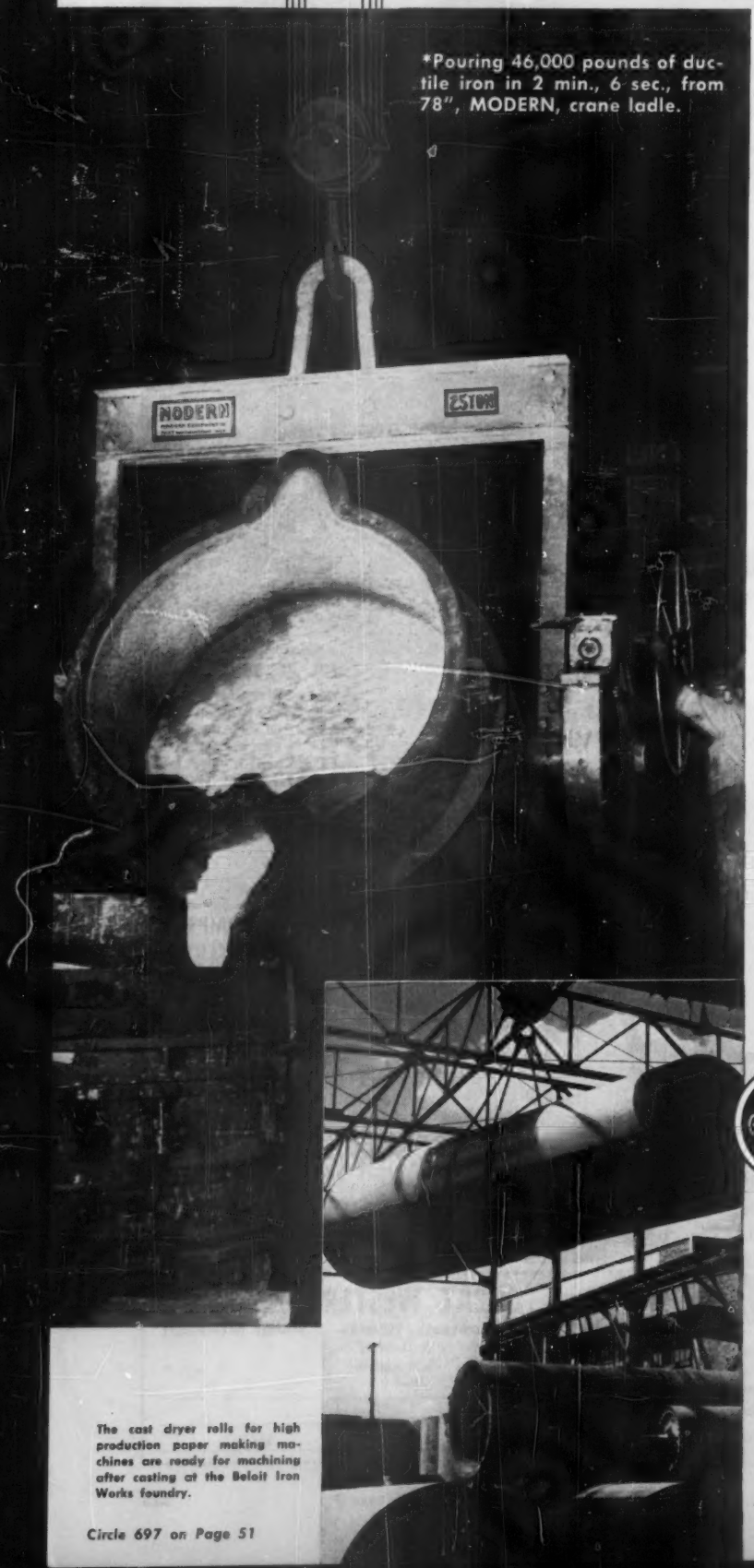
ADDRESS

CITY STATE

Circle 696 on Page 51

# LADLES ENGINEERED TO THE JOB

## *Pay off in three Big ways...*




*Pouring 46,000 pounds of ductile iron in 2 min., 6 sec., from 78", MODERN, crane ladle.

**1** *UNIFORMITY OF METAL CAST . . .
**2** MORE PAY-TIME OVER THE MOLD . . .
**3** REDUCED WASTE, LESS PIGGING . . .

Working closely with practical foundrymen, right out on the job for more than thirty years, has qualified MODERN engineers for designing the difficult, made-to-measure jobs.

*Today it may be receiving the iron direct from cupola at a spout height of 66" and pouring the 46,000 pounds into one mold from one ladle load as shown here. This huge casting was poured in 2 min., 6 seconds. The ladle of 78" top diameter and 65" deep is balanced for use with lining of 3½".

Tomorrow the requirement may be thin-wall brass and the necessary, split-second timing as required for a one-man, non-ferrous, pouring operation from a crucible.

Always regardless of the complexities MODERN ladles are designed to serve in their one-best-way. We'd like to plan with you, too. The savings you make on your engineered-to-the job ladles can be applied to your purchases of POURING DEVICES . . . MONORAIL SYSTEMS and FOUNDRY CRANES!

If your entire problem cannot be stated on the coupon put it on your letterhead, addressed to —



The cast dryer rolls for high production paper making machines are ready for machining after casting at the Beloit Iron Works foundry.

Circle 697 on Page 51

**MODERN**

**MODERN EQUIPMENT COMPANY**

Dept. F-12, Port Washington, Wisconsin

*MAIL TO MY ATTENTION:*

Standard ladle catalog, 149 ☐
Metal pouring systems, 147 ☐
Catalog on cupolas and charging methods, 147-A ☐
Crane and monorail systems, 150 ☐
More information on FREE use of MODERN, sound, color, 16mm films ☐

Company .....

Street .....

City ..... State .....

Att'n: .....

*MODERN representatives in all parts of the world.*

## *Our 76th Yuletide Message to Our Friends of the Foundry Industry*

Please accept these Holiday Wishes for health, happiness and prosperity . . . and add to them a sincere "Thank You" from all of us at Stevens.

FREDERIC B.
STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY
DETROIT 16, MICHIGAN

**BRANCHES: DETROIT • BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN • SPRINGFIELD (OHIO)**

Circle 552 on Page 51

## Are YOU Using These P

## FOUNDRY PRODUCTS

| REICHHOLD PRODUCTS | TYPE | FOUN |
|---|---|---|
| FOUNDREZ 7101,7102,7103,7104 | Liquid Resin | CONV C (Sa Bi |
| FOUNDREZ 7600,7601,7605 | Liquid Resin | |
| CO-RELEES 7300 | Oil | |
| coRCIment 7990,7991,7992,7993 | Oil | |
| FOUNDREZ 7150,7151 | Liquid Resin | SHEL AND (Dry |
| FOUNDREZ 7500,7504,7506,7555 | Powdered Resin | |
| FOUNDREZ 7520 | Granulated Resin | |
| COROVIT 7201 | Powdered Chemical Accelerator | SELF MOLDS (Dry Sand, |
| COROVIT 7202 | Oil | |

*For further information regarding any of these materi*

*Creative Chemistry ...*
*Your Partner in Progress*

RCI

REI

FO

FOU

COROVIT—Se

REICHHOLD CHEMI

Circle 553 o

| FOUNDRY PROCESS | OUTSTANDING FEATURES |
|---|---|
| NVENTIONAL CORES (Sand, Cereal, Binder, Water) | High Hot Strength<br>High Baked Strength |
| | Rapid Collapsibility<br>Fast Bake |
| | Excellent<br>Sand Conditioning |
| | Broad Baking Range<br>Excellent Workability |
| ELL MOLDS ND CORES (Dry Sand, Resin) | Unusual Stability |
| | Self-Activation |
| | High Tensile Strength |
| LF-CURING S AND CORES nd, Binder, Accelerator) | Non-Toxicity |
| | Excellent Flowability |

*aterials, write our Foundry Products Division at White Plains*

# EICHHOLD

**FOUNDRY PRODUCTS**

FOUNDREZ—Synthetic Resin Binders
T—Self-curing Binders • coRCIment—Core Oils

**HEMICALS, INC., RCI BUILDING, WHITE PLAINS, N.Y.**

553 on Page 51